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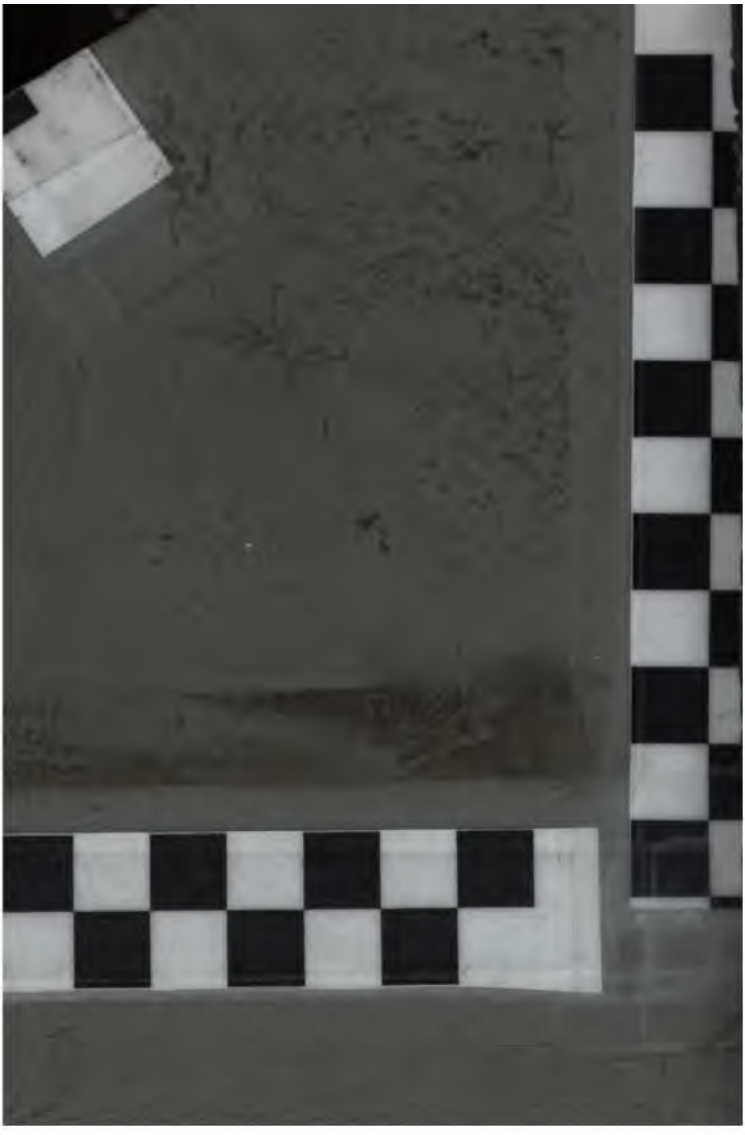

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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

VOL. XVII.

SESSION 1872-73.

Nos. I. to V.

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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Issued February 24th, 1873.]

SESSION 1872–73.

First Meeting, 11*th November*, 1872.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

The Marquez de Sa' da Bandeira and *J. D. Whitney, Esq.*, State Geologist for California, U.S., were elected Honorary Corresponding Members.

Elections.—*Edward Forster, Esq.; Captain Robert Halpin; G. H. Haydon, Esq.; Joseph Lewis, Esq.*, R.N.; *Lieut.-Colonel John R. Magrath*, R.A.; *William Man, Esq.; John Maxwell, Esq.; John Remfry, Esq.; Captain H. Spalding*, 104th Regiment; *George Parker Webb, Esq.; John Weise, Esq.*

Presentations.—*William B. Punsfer, Esq.; Charles Norris, Esq.*

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Portuguese Residents in British Guiana. 'South Sea Islanders in Queensland.' Four Papers. 1869-71. 'Emigration to New South Wales, 1871.' 'Communication with India through Turkey, 1872.' 'The Gambia Settlement, 1870.' 'West Coast of Africa, 1869.' 'East India Marine Surveys, 1871.' 'Welsh Colony on the River Chupat, in Patagonia.' Donor Lord Arthur Russell. 'Reports on Ship-Canal, Tehuantepec.' By R. W. Shufeldt. Washington, 1872. 'Hand-book for Emigrants to the United States, Boston and Maine Railroad.' 'Increase of Human Life.' By Edward Jarvis, M.D. Boston, 1872. 'Immigration into the United States.' By Edward Jarvis, M.D. Donor the author. 'Tables for Travellers.' By Admiral Bethune. Donor the author. 'Notes on Huen Thsang's Account of the Principalities of Tokharistan.' By Colonel H. Yule, C.B., R.E. Donor the author. 'Decouverte la plus important en Géographie.' Par V. A. Malte-Brun. Paris, 1872. Donor the author. 'Alexander von Humboldt.' Von Karl Bruhns. 3 vols. Purchased. 'Reisen nach dem Nordpolarmeer in 1870-71.' Von J. von Heuglin. 1st vol., 1872. Purchased. 'Euphrates Road to the East.' By W. A. Brooks, 1872. Donor the author. 'Memorandum: Tribal Divisions of Omân.' By E. C. Ross. Donors the India Office. 'Relative Power of Nations.' By Colonel Alcock. 1872. Donor the author. 'Die Aufgabe des Chemischen Unterrichts.' Von Dr. E. Erlenmeyer. Munchen, 1871. Donor the author. 'Bordeaux Guide, 1862.' Donor S. M. Drach, Esq. 'Schemacha und Seine Erdbeben.' Von A. Moritz. Tiflis, 1872. 'Sammlung von Hulfestaflen.' Von A. Moritz und H. Keifer. Tiflis, 1870. Donors the authors. 'Pyrology, or Fire Analysis.' By Capt. W. A. Ross. Donor the author. 'Tabulæ Quantitatum Besselianarum pro annis 1875 ad 1879.' Otto Struve. Petropoli, 1871. Donor the author. 'Bestimmung der Längen-Differenz zwischen Pulkowa.' Von J. Kortazzi. Donor the author. 'Observations on Base Length of Great Pyramid and Royal Coffer's Dimensions.' By S. M. Drach. 1872. Donor the author. 'Geographische Jahrbuch, 1872.' Von E. Behm. Gotha, 1872. Purchased. 'Bibliotheca Historica.' Stevens. 1870. 'Sebastian Cabot—John Cabot = 0.' Endeavoured by H. Stevens, 1870. 'Notes of the Earliest Discoverers in America, 1453-1530.' By H. Stevens. Boston, 1869. 'Schedule of 2000 American Historical Nuggets, 1470 to 1800. By H. Stevens. 1870. Donor the author. 'La Mission du Tibet 1855 à 1870.' Par C. H. Desgodins. Verdun, 1872. Donor the author. 'Les Courantes du Bassin de la Seine.' Par M. E. Belgrand et G. Lemoine. Paris, 1870. Donor the author. 'Der Golf von Buccari.' *Prag, 1871.* *Donor* the author. 'Die Eigentlichen Balearen, 1871.'

Vol. II. Leipzig. 'The Natural History of Mount Vesuvius, 1743.' Donor Captain Tupper. 'A Collection of Voyages.' 7 volumes. 1777. Donor Captain Tupper. 'Zanzibar.' By Captain R. F. Burton. 2 vols. 1872. Donor the author. 'Gazetteer of the Dominion of Canada.' By William White. Montreal, 1872. Donor the publisher. 'Exercices Hypsometriques.' Par A. Moritz. Tiflis, 1869. 'New Zealand to England.' By E. Kennedy. 1872. Donor the author. 'Exploration of Moab.' By C. D. Ginsburg. 1872. Donor the author. 'Report of the Chief Signal Officer, War Department, 1872.' U.S. Senate. 'Bishop Crowther's Overland Journey from Lokoja to Bida on the River Niger, 1872.' Donors the Church Miss. Soc. 'Coral and Coral Islands.' By J. D. Dana. 1872. Purchased. 'Commercial Reports: China, Japan, and Siam, 1866-68.' Donors the Foreign Office. 'Vierwaldstätter Alpen.' Von Schweizerhof in Luzern. Œschen. Zurich, 1871. 'Le Defile, etc., dans la Chaine du Tian Chan.' Par M. Chepelew. 1871. Donor M. L. Brasset. 'Profiles, Sections, &c., to accompany F. V. Hayden's Report on the U.S. Geological Survey of the Territories.' By H. Elliott. New York, 1872. Donor the U.S. Geologist. 'Geography of the Clans of Scotland.' By J. K. Johnston and Colonel J. A. Robertson. 1872. Donors the authors. 'Southampton to Cape Town.' By C. Chapman. Donor the author. 'Investigations of the Gibraltar Strait Current.' Captain Nares to Admiral Richards. Donors the Admiralty. 'Repartition de la Pluie entre les differentes epoques de l'Année, etc.' Par G. Lemoine. 1869. Donor the author. 'Rapport sur un Memoire de M. Delesse.' 1872. Donors the Academy. 'Geological Survey of California.' By J. D. Whitney. 'The Yosemite Guide-book.' Donor the States Geologist. 'The Idol in Horeb.' By C. T. Beke. 1871. Donor the author. 'Races Indigènes de l'Australie.' Par Paul Topinard. Paris, 1872. Donor the author. 'The new Route of Commerce, by the Isthmus of Tehuantepec, 1872.' Donors the Company. 'The Birds of Canada.' By A. Milton Ross. Toronto, 1871. Donor the author. 'Geological Survey of Ohio.' By J. S. Newberry. Columbus, 1871. Donors the Ohio Survey. 'Batavia Magnetical Observations, 1871.' Dr. P. A. Bergsma. Batavia, 1871. Donors the Government of Netherlands India. 'Floræ Chersonensis,' and 'Index Plantarum Chersonensis.' By E. A. Lindemann. Odessa, 1872. Donor the author. 'Ascension al Pico de Naiguata.' Por J. M. Spence. Caracas, 1872. Donor the author. 'Ethnographie de la Tunisie.' Par M. Schwat. 'Les Peuples Slaves.' Par E. Hervet. Donors the Société d'Ethnographie. 'O Muate Cazembe.' Pelo Major Monteiro, 1831 e 1832. Redigido pelo *Major A. C. P.* Gamitto. Lisboa, 1854. Donor the

Visconde Duprat. 'Summary of Statistics of Russia.' By Robert Michell. 1872. Donor the author.

Accessions to the Map-room since the last Meeting of June 24th, 1872.—41 Danish Charts, accompanied by books of Pilotage. Presented by H. P. Rothe, Hydrographic Office, Copenhagen. 12 sheets of the Danish Topographical Atlas. Presented by the Danish Government through the Minister of War. Map of the Province of Quebec. Presented by E. Taché, Esq. Map of Zambezia and Sofala by Marquez de Sa' da Bandeira. Presented by Viscomte Duprat. 4 sheets of the Topographical Map of Sweden and Norway. Presented by the Swedish Government. 28 sheets of Admiralty Charts. Presented through the Hydrographer, Admiral G. H. Richards. Map of Western Australia, showing Explorers' routes to 1872. Presented by the Colonial Office. Engineering plans for improving the Port of Colombo, Island of Ceylon. Presented by Mr. Grinlinton, Engineer, through H. W. Bristow, Esq. 10 sheets of the Government Map of Belgium. Chromo-lithographed. 2 sheets of a Geographical and Statistical Atlas of Sweden (on 24 sheets), by Dr. J. M. Larsson. Presented by Messrs. Hierta, of Stockholm. Plan of the Telegraph line from Adelaide to Port Darwin. Presented by F. S. Dutton, Esq., F.R.G.S. Meteorological Map of Switzerland. Presented by J. M. Ziegler, Winterthur. Map of the South-West portion of Arabia, showing the routes of Wrède, Munzinger, and Miles, in 1870. Presented by Dr. A. Petermann. MS. Map of the Transvaal Republic, the River Limpopo, and its southern branches. Presented by Mr. Button. Map of the River Madeira, Brazil. Presented through the Secretary, C. R. Markham, Esq. 31 Maps of various parts of the World. Presented by the Superintendent of the Christy Collection, A. W. Franks, Esq. Maps, on 296 sheets, of the Government Survey of India. Presented by the Secretary of State for India, through C. R. Markham, Esq. 4 Maps of Liverpool, viz., Ecclesiastical, Historical, Municipal, and Moral. Presented by the Rev. A. Hume, D.C.L. Map showing the proposed lines of communication between Burma and China. Presented by J. Coryton, Esq. Map of the territory of Griqualand West. Presented by F. H. S. Orpen, Government Surveyor, Natal. 9 MS. sheets, showing the route from Durban to the Gold-fields, explored by T. Baines, Esq. Presented by the author. 677 sheets of Ordnance Maps, and 60 Area Books. Presented through Sir H. James, Director of the Ordnance Survey. 70 sheets of the Government Map of the Netherlands. Presented by Colonel H. Rodi de Loo, *Director of the Topographical* Bureau. 13 sheets of the Topo-

graphical Survey of Denmark. Generalkaart over Sjœlland, Moen, a Laaland og Falster, 3 sheets; Generalkaart over Holstein and Lauenburg, 2 sheets; Fionia and Jutland, to North-west, 7 sheets. Presented by the Government of Denmark, through G. Klingsey, Director of the Topographical Bureau. Sweden:—Topographical Map, 8 sheets; General Map of Kalmar Län, 2 sheets; Geodetical Map, 24 sheets; Specimen-maps for exhibition, 8 sheets. Presented by the Swedish Government, through Baron Victor de Vegesack, Director. United States:—Bancroft's Map of California, Nevada, Utah, Arizona, and San Francisco. Presented through the Assistant-Secretary, Mr. Bates. Map of the Yosemite Valley, by King; Map of Sierra Nevada Valley, by Hoffmann. Presented by J. D. Whitney, Esq., State Geologist. Map of Central California. Presented by J. D. Whitney, Esq. New Zealand:—Province of Wellington, showing triangulation. Presented by H. Jackson, F.R.G.S. Atlantic Ocean:—On 12 monthly sheets, showing surface temperature. Utrecht, 1872. 12 sheets, with letter-press. Presented through C. R. Markham, Esq. Spain:—12 sheets of Coello's Atlas, in duplicate, 12 sheets. Presented by Don Francisco Coello. Also a General Map of Spain and Portugal. Madras:—Meteorological Diagram, about the time of the Cyclone of May, 1872, by N. E. Pogson. Presented through H. W. Bates, Esq., Assistant-Secretary. Africa:—Cape Colony. Trigonometrical Survey of the Boundary Line between David's Grave and Platberg, by J. E. de Villiers. Austrian Government Maps:—Map of Dalmatia, on 21 sheets, complete with Index, and 6 sheets, deficient in former supply; Special Map of Hungary, Croatia and Slavonia, on 7 sheets; Kingdom of Bohemia, 4 sheets; Carinthia, Istria, &c., 9 sheets; Galicia, &c., 11 sheets; Wallachia, 6 sheets; various other specimens of cartography, 25 sheets. Presented by the Military Geographical Institute, Vienna, through Lieutenant-Colonel Goodenough. India Government Survey, on 95 sheets. Presented by the Secretary of State for India, through C. R. Markham, Esq. Atlas, Biblical and Classical, &c., Part I., by Dr. Smith and Mr. Grove. Presented by John Murray, Esq. Asia and China:—14 Maps of various parts. Presented by R. Morrison, Esq. Portugal:—Topographical and other maps of the Kingdom of Portugal, on 15 sheets. Presented by the Portuguese Government, through General Folque, Director of the Topographical Surveys. India:—Eastern frontier—the Lushai Expeditionary Force (maps and report). Presented by C. R. Markham. Map of the Siberian Seas and Novaia Zemlia, by Dr. A. Petermann. Presented through H. W. Bates, *Esq., Assistant*-Secretary. Maps of Mongolia, Morocco,

and the Laccadive Islands (Minicoy). Presented by Dr. A. Petermann, through H. W. Bates, Esq. South Africa, showing Livingstone's route in 1857. Presented by J. Arrowsmith, Esq. Tracings of two ancient maps of Asia and Africa. Presented by Rev. G. W. Lowe. The Imperial Atlas of Modern Geography, by W. G. Blackie, PH.D., F.R.G.S. Presented by the publishers. France:—94 sheets of the Topographical Map, scale $\frac{1}{80000}$; 44 Plans of Villages; 22 sheets of the Topographical Map, scale, $\frac{1}{320000}$; 32 sheets of the new Map of Russia, scale, $\frac{1}{420000}$; 19 Maps of the French Colonies, and various parts. This presentation consists of 235 sheets, and completes nearly all maps published by the Dépôt de la Guerre to this date. Presented by the French Government, through the Ministère de la Guerre, Paris.

The PRESIDENT congratulated the Society on this large accession to their collections, and then delivered the following Address:—

In opening the Session of 1872-73, my first duty is to congratulate the Fellows of the Royal Geographical Society on being again permitted to hold their meetings in this noble hall. The Senate of the London University, in recognition of the valuable services that we render to the public, have exempted us from the operation of the rule which confines the use of their premises to strictly educational purposes; and have thus again, with much liberality, placed their theatre at our disposal, for the Meetings of the ensuing Session. We cordially thank the governing body of the London University for their kind consideration, and trust that the interest of the Papers, about to be read and discussed by us, will fully justify the special favour which they have shown us.

I now proceed to recapitulate, in the briefest possible manner, the leading incidents which have occurred in that fertile field of controversial interest, the exploration of Africa, during the interval that has elapsed since the close of our last Session at the end of June. Up to that time we had merely received a brief telegraphic announcement that Mr. Stanley had arrived at Zanzibar with despatches, having recently left Livingstone alive and well at Unyanyembe, half-way between Ujiji and the sea-coast. In the belief that the Indian mail, then daily expected, would bring these despatches, which could not fail to be of much geographical importance, as well as intensely interesting to Livingstone's personal friends and admirers, I notified to the Fellows at our last meeting, on June 24th, that an Extraordinary Meeting would probably be *held a few days later*, when full intelligence from the great tra-

veller would be laid before them. But all July passed away, and no letters reached us. Owing, indeed, to Mr. Stanley's accidental detention for a whole month at the Seychelles, it was the first week in August before the despatches were received in London, and as the Council and Fellows were then scattered to the four corners of the earth, it appeared hopeless to call a meeting together. I wrote, however, to Mr. Stanley a letter of welcome on his arrival (being myself in the country), explaining these circumstances and suggesting that, as the London season was over, the approaching meeting of the British Association at Brighton offered the best occasion for his introduction to the English geographical public. Mr. Stanley cheerfully assented to this arrangement, and delivered an address accordingly to our Geographical Section, which was of much general interest. On this first occasion of Mr. Stanley's appearance in public, I took the opportunity of testifying, on behalf of the Royal Geographical Society, to our admiration of the courage and energy which he had shown in forcing his way through all difficulties from Unyanyembe to Ujiji, and to our high appreciation of the value of the services he had rendered to Geography in relieving Livingstone and bringing his journal and despatches to England. An official letter from the Council, embodying the same sentiments, had been previously addressed to Mr. Stanley, and, at a later period, I had further the gratification of announcing (at the banquet which we held in his honour on the 21st of last month) that the Council, having fully considered the high character of his services, had resolved, that day, to award him the Victoria Medal for 1873. I have been thus particular in recording the relations between Mr. Stanley and this Society, because, owing to the accident of there being no one to welcome him on behalf of the geographers, on his first arrival in England, an impression has gone abroad that his reception by us was not all that could be desired—was not, in fact, as warm and cordial as would have been accorded to the officers of our own Expedition, had they been so fortunate as to have first met with Livingstone at Ujiji, and relieved him in his extreme need. I will only further say, in reference to this subject, that the Geographical Council are not conscious of having ever made a distinction in their distribution of honours and rewards on account of a difference in faith or nation: their motto has uniformly been "Detur dignissimo;" and as they do honestly consider Mr. Stanley's journey to Lake Tanganyika to be in its results the most important geographical achievement of the year, they feel that, in awarding him their medal, they are only discharging their strict duty, while at the same time they are doing

honour to Livingstone and promoting the great end of African discovery.

The story of our own Relief Expedition, from which so much was expected, and whose steps were followed with so much eagerness by all the Fellows of this Society during the spring and summer, may be told in a few words. The Expedition, fully equipped, in possession of ample supplies, and attended by a guard which had received six months' pay in advance, was ready to start for the interior at the end of May, when intelligence first reached Zanzibar that Livingstone had been already found and relieved by Stanley. Lieut. Dawson, on hearing this news, at once retired from the command, broke up the expedition, and shortly afterwards sailed for England. Other arrangements were then proposed for conducting stores to Livingstone, under charge of a subordinate officer; but ultimately—Stanley having in the mean time reached the coast with orders which were erroneously supposed to preclude the advance of any party—the various subordinate officers, one after the other, withdrew from the service, and the whole party returned to England. Much disappointment was felt at this abrupt termination of an expedition which had been prepared with so much care and at so great an expense, and which promised so well, both in regard to relieving Livingstone and advancing our geographical knowledge. The Committee of the Geographical Council charged with the management of the Search and Relief Fund, held frequent sittings during the recess to consider the conduct of the officers of the Expedition; and ultimately, after a most patient investigation, delivered two Reports to the Subscribers to the Fund, the purport of which was that they disapproved of the conduct of Lieut. Dawson in breaking up the expedition, and that they attributed it to a lamentable error of judgment that he did not carry on to the Doctor, as supplementary to Stanley's Relief, a supply of arms, instruments, medicines, and other articles of which he manifestly stood in need. The judgment delivered by the Committee was generally concurred in by the public, and has since been greatly fortified by letters written by Dr. Livingstone on July 1st, in which, in answer to his son's letters from Zanzibar, he deplores the break up of the Expedition, showing how valuable would have been to him the arrival of the officers at Unyanyembe, and how he proposed subsequently to have utilized their services. At the same time it is only fair to Lieut. Dawson to say that no imputation whatever rests upon his courage or his honour. He seems to have retired from the field owing to a wrong impression of Dr. Livingstone's character, as well as under a mistaken view of his relations with this

Society, fancying—for it was nothing more than a fancy—that he could not carry out the instructions of the Society with regard to the acquisition of Geographical information in Africa without injury to the Doctor's interests and without acting in opposition to his wishes.

I am sorry to have to notice these personal matters. They are always disagreeable, but particularly so when there has been so much anonymous and acrimonious controversy on the subject. It is a relief therefore to be now able to turn to Livingstone himself, who is the real focus of interest, and through whom alone the enterprise of Stanley or the shortcomings of our own Expedition acquire geographical importance. For three years, as you may remember, Livingstone was lost to view. We never doubted of his well-being in this Society, since continuous Native reports of his wanderings in Manyema were transmitted to us by Dr. Kirk, and since we had inherited, moreover, from our late President, a belief in the Doctor's vitality as a standard article of faith; but our confidence was hardly shared in by the public, and hence arose the unjustifiable sneers and doubts with which the announcement of Mr. Stanley's success and the first publication of the Livingstone Despatches were in some quarters received. Let it be understood, then, once for all, that there is not the remotest ground for questioning the accuracy of Mr. Stanley's statement. It is positively certain that Stanley and Livingstone met at Ujiji this time last year, that they travelled on an exploring journey round the northern end of Lake Tanganyika, and subsequently came down together to Unyanyembe, where the Doctor still was at the date of his last despatches. Livingstone has undergone great physical suffering during the last three years, and has, moreover, had much to try his temper and his patience. By a strange concatenation of accidents, all the good intentions of his friends seem for a time to have been frustrated. The men sent up from the coast to serve and assist him proved a curse rather than a blessing, compelling him to turn back at the most important point of his exploration. The agents, too, employed to communicate with him played him false, intercepting and destroying his letters, dissipating his supplies, and in some cases actually plundering the stores in order to obtain means for pursuing their own ungodly traffic in ivory and slaves. Livingstone complains that, owing to these nefarious proceedings, he had lost two years of time, had been subjected to a needless tramp of 1800 miles, and had suffered severely both in health and in pocket, reaching Ujiji, in fact, where Stanley found and relieved him, "a mere ruckle of bones;" and it is not therefore surprising that, while

smarting under his losses and injuries, he should have reflected with some bitterness on Dr. Kirk, the Acting Consul at Zanzibar, who was more or less concerned in sending off the supplies and in selecting the agents to be employed. As Kirk and Livingstone were old fellow-travellers and intimate associates, this threatened rupture between them caused much chagrin to their mutual friends in England, and augured ill for any further common action between them on the East Coast of Africa; but it is satisfactory to see, from Livingstone's last letters, that the clouds were passing away. Livingstone, indeed, now fully admits the kind and honest intentions of Kirk, though they were unfortunately unsuccessful, and harmony therefore is, we may hope, about to be restored between them.

I must now remind the Society that the last letters received from Livingstone in England, previous to his meeting with Stanley, were dated from Ujiji in May, 1869. It appears that he left Ujiji in July of that year, crossed the Lake Tanganyika, and travelled westward to Bambarré in Manyema, descending 1000 feet from the level of the lake to the great Central African Valley, where he again came upon the large rivers which in previous years he had followed up from their sources in the Muchinga Mountains, in about 12° south latitude. Livingstone then travelled about Manyema for nearly a year, searching for the bed of the Lualaba. He remained in an Arab camp not far from the Balegga Mountains, which enclose the Albert Nyanza to the south-west, during the rainy season from February to July of 1870, and returned shortly afterwards to Bambarré, where he was laid up with ulcers in the feet until the end of the year. Early in 1871, the men who had been sent from Zanzibar in October, 1869, with a tent and supplies for Livingstone reached Bambarré, and the Doctor at once set out with them to trace the lower course of the Lualaba. He followed the river nearly to the point of its junction with the Lomamé or Kassabi, and ascertained that, four or five days lower down, the united streams fell into a large reedy lake, beyond which point nothing was known. After waiting three months in this vicinity for the arrival of a friendly Arab chief, through whose assistance, as his own men refused to proceed further, he hoped to cross over from the Lualaba to the Lomamé and trace that river upwards, Livingstone was subjected to the trial of being present, on June 13th, at a slave massacre, the atrocity of which seems to have so thoroughly humiliated and shocked him that he could no longer remain in the company of the Arab merchants. Turning back, *accordingly, from* this point, he gave up all further exploration, and

set off at once for Ujiji, where, after a dreary tramp of 400 or 500 miles, he arrived at the end of October, broken in mind and body, to be joined, however, in a few weeks by Mr. Stanley, and under his fostering care to be restored in due course to his usual health and vigour.

The accessions to our knowledge of African geography obtained during Livingstone's wanderings in the Manyema country are very considerable. He had in his previous journeys identified but one single river, which he traced through a chain of lakes and under the various names of Chambeze, Luapula, and Lualaba, from the Muchinga Mountains, north of Nyassa, past the capital of Cazembe to the borders of the Manyema country west of Tanganyika; and all our speculations were, therefore, directed to the settlement of the question whether this lacustrine river, which as we supposed drained all Central Africa, was really the head-waters of the Nile—entering the Nile system either through Tanganyika or Albert Nyanza—or whether it turned to the west as an affluent of the Congo: but the question has recently been much enlarged, and, if I may be allowed to say so, at the same time simplified; for Livingstone has now discovered that there is not one but three Lualabas, all rivers of the first class, running through lakes in nearly parallel courses, and commingling their waters a few degrees south of the Equator, where they form a gigantic stream about two miles in width, and of such depth and rapidity that its flow of water in the dry season has been calculated, at the very lowest estimate, at 124,000 cubic feet per second. Of this triple water-system, which, running north and south from 12° south latitude to the Equator, drains an area of nearly 10° of longitude, the central river, named the Lufira, had been already named and described by the Pombeiros, who crossed it in a canoe near its source, while the third or more westerly stream, the Kassabi or Loké, called lower down the Lomamé, and well known to the Portuguese, had been visited by Livingstone himself in 1855, though, strangely enough, he does not seem to have recognized his old friend of the mountains in the magnificent river to which he gave the name of "Young's Lualaba." It may here be noted that, although the head-streams of the Lufira and Kassabi were discovered years ago by the Portuguese, to Livingstone, at any rate, belongs the credit of connecting those head-streams with the great basin of Equatorial Africa. Livingstone's furthest point on the Lualaba was ascertained by him to be in about 4° south latitude, but the longitude of the position was not so easily determined. He had estimated by dead reckoning that he was 5° west of *Ujiji*, or in long. 25° E.; but a lunar observation,

which he seems to have worked out at a later period, placed him 2° further to the east, or in about long. 27°.

There can be no reasonable doubt that this great water-system of Central Africa belongs to the Congo and not to the Nile. The proofs of the identity of the Lualaba and the Congo, derived from a comparison of height-measurements, of volume of water, of the periodical rains and rise of the rivers, &c., have been put together very clearly in a paper by Dr. Behm which has just appeared in the current number of Petermann's 'Mittheilungen,' and an abstract of which will be read to you at the conclusion of my present address; and many arguments arising from local information, as well as from coincidences of natural history and ethnology, might be added in corroboration. The only impediment, indeed, to a full and clear understanding on this point is the remarkable fact that, although Livingstone had followed down the gradual slope of the Lualaba from the high plateau where it rises, 5000 or 6000 ft. above the sea-level, to a point where the barometer gave an elevation of only 2000 feet—that is to a point depressed 1000 feet below the parallel Nile basin to the eastward; and although the constant trending of the waters to the west haunted him with misgivings, still he clung tenaciously to his old belief that he must be upon the track of the Nile, and even speculated on the possibility of the great river he was pursuing debouching by the Bahr-el-Ghazal. It must be borne in mind, however, that Livingstone in his African solitude had no knowledge of Schweinfurth's discoveries. He had no idea that one, or perhaps two, watersheds intervened between the Lualaba and the head-waters of the Bahr-el-Ghazal; nor does he seem to have been aware that his great river at Nyangwé contained 19 times the volume of water contributed by the western affluent of the White Nile. When this revelation breaks on him it is not too much to suppose that he will abandon his Nile theory and rest satisfied with the secondary honour—if indeed it be secondary—of having discovered and traced the upper course of the Congo, which is emphatically called by the natives "the great river" of Africa.! So satisfied, indeed, are Livingstone's friends that the Lualaba is identical with the Congo, and that if, therefore, he pursue his intended journey round Lake Tanganyika to the so-called "Fountains of the Nile," and so on to Lake Lincoln and the Lomamé, he will be brought into communication with the Western Coast of Africa, that they have originated an independent relief Expedition—to be called "The Livingstone Congo Expedition"—which is to ascend the Congo from above the rapids and *endeavour to penetrate* to the Equatorial Lake where Living-

stone's rivers are lost, and in the vicinity of which, towards the close of next year, the great traveller ought to be found. Mr. J. Young, of Kelly, who is Livingstone's great friend and patron, and after whom the Western Lualaba has been named, has, in the most liberal manner, taken on himself the expenses of the proposed expedition to the extent of 1500*l.* or 2000*l.*, and, if necessary, this grant will be supplemented by subscriptions from the public and by a contribution from the funds of the Society. I have further much pleasure in reporting that a young officer, Lieutenant Grandy of the Royal Navy, in every way qualified for the service, has volunteered to lead the Expedition, which is to consist of Kroomen from Sierra Leone, and that he will probably leave England for the West Coast of Africa before the end of the present month.

It is at the same time a great satisfaction to me to be able to announce that "the Livingstone Congo Expedition," which will rendezvous in the first instance at St. Paul de Loanda, will have the cordial concurrence and support of the Portuguese authorities, the Visconde Duprat, Consul-General of Portugal, who sits on my left hand, being already in communication with his Government on the subject, and being authorised to assure us of the interest which the Court of Lisbon takes in African exploration in general, and its especial desire to see the Congo opened up to trade and civilizing influences. And I will venture to add, that it is of the more importance for us to take advantage of this friendly disposition of the Portuguese Government by sending an Expedition at once to ascend the Congo and pre-occupy the ground, since a rival German Expedition has been officially announced as in preparation for the same region, and since, although England has no reason to shrink from the honourable competition of other European nations in explorations, either by sea or land, still, under present circumstances, it might be desirable to avoid the risk of another Berlin arbitration on a disputed question of priority of discovery.

The other points of interest referring to Africa may be thus briefly summarized. Livingstone was last heard of at Unyanyembe on July 1st: he was awaiting the arrival of the guard of fifty men, well armed, equipped, and supplied, which had been sent up from Zanzibar by Mr. Stanley, aided by our own Expedition, at the end of May; and proposed to start for Fipa, at the southern end of Lake Tanganyika, as soon as the party joined him. In his subsequent travels he will, no doubt, be guided by information he may receive from England. At present he talks of visiting the sources of the Lualaba and Lufira, and then passing by the *copper-mines of Katanga* and the excavations of Kabogo, to

the Lakes Kamolondo and Lincoln, or Chebugo (the Uhanja apparently, of Ladislaus), where he would embark on the Lomamé; but it is very probable that this programme may be modified in execution. The deputation, indeed, of Sir Bartle Frere on a mission to Zanzibar for the suppression of the Slave Trade, of which Livingstone may hear before he leaves the vicinity of Lake Tanganyika, will be to him an event of the intensest interest, and may thus have an important influence on his future movements. At any rate, in the hope and expectation that some means may be found of opening a direct communication with Livingstone while Sir Bartle is still at Zanzibar, the Council has decided upon giving the latter officer, who is, as you know, a Vice-President of this Society, a discretionary power over the Relief Fund to the extent of 1500*l.*, to be applied in furtherance of Livingstone's explorations, and in facilitating his return to the coast.

In order further to strengthen Sir Bartle's hands, and with a view of meeting the wishes of Livingstone, expressed in his last letter, it has also been proposed to accept the services of a young naval officer, V. Lovett Cameron, who offers to go out at once to Zanzibar, and there hold himself in readiness to conduct stores and supplies into the interior. Sir Bartle, in the exercise of his discretion, and guided by local information, would then decide whether Lieutenant Cameron should proceed in the first instance to join Livingstone, and take his orders as to his further employment, or whether he should merely deposit his supplies in some convenient spot in the vicinity of Lake Tanganyika, and there hold himself at Livingstone's disposal; but in either case it is probable that on his return journey he would be directed to examine the geography of the Lake Region of Equatorial Africa, which is now one of the chief African problems remaining unsolved, and which we know to have recently attracted much of Livingstone's attention. After thus settling the vexed question as to the configuration of the Victoria Nyanza, and deciding authoritatively whether it consist of one body of water, or of several independent though adjacent lakes, he might further visit the Albert Nyanza, examine the sources of the Loanda and Rusisi, which Livingstone and Stanley have ascertained to fall into Lake Tanganyika, and put the finishing stroke to our knowledge of the geography of those parts, by determining the extent and contour of the south-western extremity of Baker's Lake. It is not, indeed, impossible that, under such circumstances, Lieutenant Cameron might fall in with *Baker's flotilla on the* Albert Nyanza, as reports have reached us

though not as yet officially confirmed, that Sir S. Baker had pushed on during last summer with a flying column from Gondokoro to the point where the Nile leaves the Nyanza, and had made arrangements for his steamer and boats to be brought in carts, above the rapids, to the same spot, to be afterwards put together and launched upon the lake.

I now turn to a subject which, to the Fellows of the Royal Geographical Society, is only second in interest to that of African discovery;—I mean the subject of Arctic Exploration. The most important, perhaps, and best planned of the Expeditions which have left Europe for the exploration of the unknown North Polar area during this year, is that which has been fitted out by the *Austro-Hungarian* nation, and placed under the experienced leadership of Weyprecht and Payer, men whose names are already familiar in Arctic geography, and whose preliminary voyage of last year had such remarkable results. The instructions carried by this Expedition give as its main object the examination of the region north of Siberia; and the goal to be constantly kept in view by its commanders, is to reach Behring Strait within the period of two winters and three summers, for which time the Expedition is well provided. The starting-point of exploration is considered to be the north coast of Novaia Zemlia, where Count Wiltschek, in an auxiliary voyage at his own private cost, will form a depot of provisions and coals, to be used only in case of absolute necessity. Count Wiltschek's ship left Tromsö in June of this year: the purpose of its commander being to pay a flying visit first to Spitzbergen, where he would ascend the Hornsund Tind (4560 feet), the highest known mountain of these islands, and thence to proceed to the north of Novaia Zemlia. The main expedition sailed from Bremerhafen on the 13th of June, and, after calling at Tromsö, finally started for the Icy Sea on the 13th of July. The latest intelligence we possess of these vessels is of the 16th August, at which time the chief and auxiliary expeditions appear to have met on the north-east coast of Novaia Zemlia. The vessels had encountered large quantities of ice, since the Great Polar Stream appears to have been deflected this year from its ordinary course on the east of Spitzbergen (which has been found to be free of ice) towards Novaia Zemlia; but the experiences of past years in these regions show that the sea north and east of Novaia Zemlia may be open even late in September: so that there is no reason to apprehend that both vessels may not yet carry out their programme for this season; the one to form a depôt on the north of the island, the other to *push eastward to* winter quarters on the Siberian Coast.

Next in importance is the *Swedish Expedition*, the fifth which has been fitted out by that country, partly at Government cost, partly by aid of scientific societies, and partly by national enterprise. Two ships of the Swedish navy, each commanded by a naval officer, constitute the expedition which sailed in July * under the direction of the veteran Professor Nordenskiöld. The general scheme to be followed is that of wintering in the Parry Islands, in lat. 80° 40′ † north of Spitzbergen, and of penetrating thence over-ice towards the Pole, by means of rein-deer sledges, early in 1873. By the latest account, this Expedition had reached Green Harbour on the west coast of Spitzbergen, on the 4th of August, and so far all had gone well.

The only other national expedition being carried on at present within the Polar Region is that of the American Government, under Captain Hall; but of this there are no satisfactory accounts. According, indeed, to a letter I have just received from our Honorary Corresponding Member, Admiral Irminger, of Copenhagen, no intelligence whatever had been received, when the Danish vessels left in September last, at any of the settlements in Greenland, of Hall's Expedition since its departure from Tissuasak in September, 1871; so that the rumour of its return to Disco in February last must be held to be destitute of foundation. The only Englishman known to be engaged in Arctic exploration this year is Mr. Edward Whymper, of Alpine fame, who, after carefully planning and preparing for, at his own cost, an inland journey in Western Greenland, left Copenhagen in May for the Danish Colonies. I learn from Admiral Irminger that Mr. Whymper had returned from Omenak to Godhavn in September last, and was expected soon to arrive at Copenhagen in one of the Danish ships.

Not the least praiseworthy and productive of the Arctic voyages which have been made during past years are those of the Norwegian whaling fleet, whose captains now vie with one another in sailing far into the Icy Sea, in making new discoveries there, and in constantly adding to our knowledge of its climate by carefully kept meteorological registers. Much of the credit which arises from the results of these voyages is due to the able Directions given to the whaling masters by Professor Mohn, of Christiana, and to the enterprising spirit which he has infused into the fleet. Two of these fishers, Captains Altmann and Johnsen, have already this year brought home the most interesting accounts of King Karl Land, an island of the Spitzbergen Archipelago, first seen by the

* Left the Sound 18th June; left Tromsö 21st July.

† *No expedition has as* yet wintered in any higher latitude than 78° 37′ N.

English voyager Wiche in 1617, but never previously visited. In length the newly-examined island measures about 44 nautical miles; no glaciers exist in it, and the snow-fields are disconnected, and of no great extent. Vast quantities of drift-wood lie high above the tide-mark on its eastern shores; and the ordinary polar animals are found there in abundance, the reindeer being specially large and well nourished.

With this example before us of the great annual gain to science derived from the well-directed efforts of the Norwegian fishers, it is to be deplored that no advantage has as yet been taken of our own resources of a like kind for increasing the knowledge of the Arctic Region. Every year for centuries back a numerous fleet of well-equipped vessels (most of these are now steam-vessels) has left our shores for the whaling-grounds on the east and west of Greenland and Baffin Bay; yet since the time of the Scoresbys, who stand alone, no single British whale-fisher has contributed anything to extend general information on this most interesting region.* The condition of the ice in Baffin Bay, and the Straits leading to and from it, at various seasons and in different years, has the most important bearing on the questions of climate and of oceanic circulation in the northern hemisphere, and of these conditions we possess no accurate knowledge whatever. It is well worthy, then, of the consideration of the Council of our Society, as well as of the Meteorological Department of the Board of Trade, whether it might not be desirable that a code of instructions should be drawn up for the guidance of the masters of British whaling-vessels in observing and recording such important phenomena. By this means a harvest of information might be yearly gathered, the gain to science being very considerable, while the cost of obtaining it would be very trifling.

H.M. Ship *Challenger*, under the Command of Captain Nares, will in all probability leave England in the course of the ensuing month. Allusion was made in my last Anniversary Address to the scientific and important results that are likely to accrue from this voyage, and there is no doubt that the expedition, fully equipped as it is, will bring back a greater insight into those oceanic currents and deep-sea temperatures with which we are at present so imperfectly acquainted.

There are a few other current matters of geographical interest

* With the view of testing this point, one of the Fellows of the Society has carefully examined a number of whaling log-books, selected as the best from a large store, but these prove to be the most unsatisfactory and worthless documents, containing scarcely a single accurately observed position, and not one record of temperature, or other meteorological fact.

which require notice, but they need not long detain us. I am informed that the Survey of Palestine is proceeding very satisfactorily, the bases which were previously measured in the north and south of the country having been recently connected together by triangulation, and facilities being thus afforded for extending the survey over the whole region between the Mediterranean and the Dead Sea. Capt. Wilson, a member of our Council, who initiated the survey, and has ever since taken the warmest interest in its progress, has promised at an early date to furnish us with a full report of the proceedings of the officers employed, which cannot fail to command our earnest attention and approval.

The geography of the regions adjoining Palestine has also received some valuable illustration during the recess, as well from the publication of 'Unexplored Syria,' by Capt. Burton and Mr. Tyrwhitt Drake, as from the Reports which were read by Dr. Ginsburg and Canon Tristram at the meeting of the British Association on the results of the late expedition to Moab. Dr. Tristram's discovery, indeed, of a ruined palace of the Sassanian period, near the line of the pilgrim-road from Damascus to Medina, has excited general interest, and is likely to give rise to much antiquarian discussion.

I am further able to report very favourably on the progress of Capt. Felix Jones's Map of Western Asia, the preparation of which I told you in my last Anniversary Address had been sanctioned by the Indian Council. Capt. Jones has been steadily working during the summer and autumn at his interesting compilation, and among other valuable results has succeeded, through the kind assistance of the Foreign Office, in transferring to his own map the very elaborate detail of the Turco-Persian frontier survey, the original of which, being executed on 20 large sheets, was absolutely useless for general reference.

Another subject of congratulation is the return of Sir Frederick Goldsmid and his staff from Central Asia. Among the geographical fruits of Sir F. Goldsmid's recent missions to the East—missions highly honourable to himself, and fraught with the most important consequences to our British Indian Empire in preserving tranquillity in the countries adjoining our frontier—are two most interesting maps; one delineating the disputed districts on the Perso-Kelat border from the sea-coast to Jalk, and the other exhibiting in minute detail the topography of the entire province of Seistan. These maps, executed with scientific accuracy, and based on a series of astronomical observations both for latitude and longitude, are highly creditable to the Engineer officers, Majors St.

John and Lovett, who constructed them under Sir F. Goldsmid's orders; and when published, as I hope they shortly will be, with illustrative memoirs, in our 'Journal,' they will, for the first time, furnish us with a true representation of the geographical features of Eastern Persia.

On the Russian frontier, also, exploration is always making progress. The reconnaissances, undertaken with a view to the possible necessity of hostilities against Khiva, are making us daily better acquainted with the Turcoman Steppes between the Atrek River and the Aral Sea; while, in reference to the countries further to the east. Mr. Fedchenko, who has recently paid a visit to England, is about to publish, in five volumes, an account of his discoveries and researches in the Zar-afshan Valley and the Asferah Mountains between Pamir and Kokand. The late Russian mission under Baron Kaulbars to Kashgar will have, further, determinately connected the Northern system of geodetic measurement with the observations of Messrs. Shaw and Hayward, which, again, through the careful work of Major Montgomerie's "employés," are now brought into contact with the great Trigonometrical Survey of India. There are, moreover, some interesting papers on the Geography of Mongolia and Zungaria in the last number of the 'Proceedings of the Russian Geographical Society,' an abstract of which will, it is hoped, be transferred to our own 'Journal.' I further take this opportunity of expressing the great satisfaction with which we observe the attendance at our meeting of Baron Osten-Sacken, the late distinguished Secretary of the Imperial Russian Geographical Society, and himself a Geographer of high reputation and experience, who conducted, a few years back, the scientific department of a reconnoitring expedition along the Kashgar frontier, and to whom, indeed, we are mainly indebted for our knowledge of the geography of this interesting portion of Central Asia.

There is not much at present to report from India; but we are promised a paper by Major Godwin-Austen on the Garo Hills, and we may also expect some valuable contributions to our knowledge of the Burmo-Chinese frontier from the indefatigable Mr. Cooper, who has returned with the Panthay Mission to the East, and who proposes, in their company, to penetrate either from Assam or Bhamo to his old field of research in Yunan.

It remains that I should notice a most important scheme of exploration that has been recently announced to us from Australia. Mr. Forrest, who is a Fellow of this Society, and is also well known from his adventurous and successful journey along the southern shores of Australia from Perth to Adelaide, has laid before the

Government of Western Australia, by whom it has been well received, a project for penetrating from the West Coast by the valley of the Murchison River, due eastward, until he reaches the central line of telegraph which now connects Adelaide with Port Darwin. This will involve the exploration of about 1000 miles of "terra incognita;" and as it is thought probable that a large river, or rivers, may be found running eastward from the watershed of the Murchison, the Expedition may lead to results of vast importance to the colony. When we see, indeed, that a telegraphic wire, bringing us daily intelligence from Adelaide, is now laid continuously across the continent from south to north, along a line which was only first explored by Stuart in 1860, there would seem to be no reason for distrusting the power of the colonists to cross the continent in due time from west to east. At any rate, their enterprising spirit deserves our best encouragement, and we accordingly offer to Mr. Forrest our cordial wishes for his success.

I would further desire to draw the attention of the Society to the very important papers on forests as connected with Hydrology, by Dr. Brandis and Mons. Lemoine, as well as to two excellent Memoirs 'On the Place of Geography in Education,' and 'On the Scope of Scientific Geography,' by the Rev. Mr. Hale and Major-General Strachey, which were read before Section E, at the late meeting of the British Association at Brighton, and the value of which was at the time pointed out by our accomplished Vice-President, Mr. F. Galton, who presided over the Section, and than whom no one is better qualified to discuss questions relating either to Physical Geography or to Geographical education. The Fellows must remember that although these topics do not possess the same immediate interest for the public as descriptions of travel and personal adventure, they are of far more enduring importance, and, in fact, lie at the root of the science, for the cultivation of which this Society was instituted.

And now, Gentlemen, before concluding, I have only to announce to you that the Council, taking into account the especial interest which at present attaches to the geography of the interior of Africa, in connection with Livingstone's explorations, have resolved to print an English translation of Dr. Lacerda's Travels from Téte to Cazembé, which has been lately placed at their disposal by our indefatigable correspondent, Captain Burton, and to circulate it, with the addition of a translation of the Pombeiros' journey, and an abstract of that of Monteiro and Gamitto, as a supplementary volume of the 'Journal.'

The Session may now be declared opened, and I hope it may

be productive both of instruction and amusement to the Fellows. We are promised many papers of interest, one of the most important being a detailed account of the ascent of Kilimanjaro, by the Rev. Mr. New, of which an abstract, contained in a private letter, was communicated to you in the summer. Mr. New, I may add, who was temporarily connected with the Dawson expedition, and whom the Committee declared in their Report to have come out of the enquiry unscathed and without having in any way forfeited their confidence, is at present in England; but it is hoped that ere long his services may be utilized in renewed explorations in Eastern Africa, for which his knowledge, experience, and thorough acclimatization render him peculiarly fitted.

Mr. C. R. MARKHAM, the Secretary, next proceeded to read the following paper:—

Dr. Livingstone's Exploration of the Upper Congo. By DR. E. BEHM.*

PROOFS OF THE IDENTITY OF THE LUALABA WITH THE CONGO.

THE view expressed in the title of this paper, that the waters discovered and traced through a great extent of country by Dr. Livingstone during recent years, do not, as he believes, belong to the Nile, but to the Congo, is now almost universally held by professed geographers: it appears frequently in the numerous writings and discussions upon Livingstone's and Stanley's reports. At the meeting of the British Association at Brighton, especially, its importance was sought to be maintained (in opposition to an audience unlearned in the geographical questions involved, and carried away by the presence and fluency of Mr. Stanley), and although adequate reasons were not brought forward for its support, yet the impression foreshadowing its truth gained ground as a necessary conclusion from the received facts.

Uncertainty was caused by the insufficiency of the arguments brought into the field; these were based on measurements of elevation, which, from the manner in which they were made, could only claim a small amount of exactitude, and upon the quantity of water in the rivers under consideration. Both of these arguments sufficed to separate the Lualaba from the Nile, not, however, to carry it to the Congo. For this a third element was necessary, which, being comprehended in the changes of the yearly seasons, is happily free from the errors of instruments and mistakes of travellers. As surely as the sun stands over the southern hemisphere in our winter, and over the northern in our summer, bringing the rains and the swellings of the tropical rivers when it is in the zenith in regard to them, so surely can it be predicated, from a comparison of the rainy seasons and times of rising, that the Lualaba belongs to no river of the northern hemisphere; in the southern hemisphere Africa possesses only one river, the Congo, which could take up the vast water supply of the Lualaba. It will now be endeavoured to establish the points thus indicated:—

(1.) *Elevations.*—In his despatch of 1st November, 1871, to Earl Clarendon, Livingstone writes:—"Most of the intelligent natives and traders thought that all the rivers of the upper part of that valley (the Lualaba Valley) flowed into Tanganyika. But the barometer told me that to do so the waters must flow up hill. The great rivers and the great lakes" (belonging to the

* *Translated by Mr. Keith Johnston, from the 'Geogr. Mittheilungen.'*

Lualaba) "all make their waters converge into the deep trough of the valley, which is a full inch of the barometer lower than the Upper Tanganyika. . . . . The mean of many barometric and boiling-point observations made Upper Tanganyika 2880 feet high. Respect for Speke's memory made me hazard the conjecture that he found it to be nearly the same, but, from the habit of writing the Annum Domini, a mere slip of the pen made him say 1844 feet; but I have more confidence in the barometers than in the boiling-points, and they make Tanganyika over 3000 feet, and the lower part of central Lualaba one inch lower, or about the altitude ascribed to Gondokoro."

The height of Gondokoro on the Kir or Bahr-el-Jebel, the main stream of the White Nile, coming from the Albert Lake, has been comparatively well ascertained by various measurements. According to Baker it is 1999 feet; Peney makes it 2060 feet; the height obtained by Dovyak (relatively to Khartum, 1345 feet from the mean of the best measurements) is 2068 feet; and Dr. Hann's investigations show that its elevation may be confidently taken at the average of 2024 English feet, and the surface of the Mwutan (Albert Lake) lies at 2720, or (according to Buchan's recomputation of Baker's boiling-point thermometer observations) 2500 feet above the sea. Although we cannot yet set any great value upon the elevation determined by Dr. Livingstone, since the observations have not been subjected to any critical examination, yet the important difference of level between Tanganyika and the central Lualaba must be considered as established. The agreement of Livingstone's height for the Tanganyika with Findlay's correction of Speke's observation (2800) creates a decided confidence in his measurements. That the Lualaba cannot fall into the Tanganyika is then abundantly proved by these facts; Livingstone has also directly shown this to be the case by the route which he has traversed; his voyage especially round the northern half of the lake with Mr. Stanley, during November and December of 1871, shows that in this part of Tanganyika, where alone a connection with the Lualaba was conceivable, there is no great inflowing river. The largest, the Rusizi, coming from the northern mountains, was found to be not more than 30 yards wide and very shallow.*

That the Mwutan (Albert Lake) is higher than the Lualaba may be accepted, if not with such certainty, at least with greater probability; for the lake must lie several hundred feet above the level of Gondokoro, which point is reached by its outflowing river after a course through several degrees of latitude, and down very considerable cataracts. Besides this, it is known from the observations of Baker and Speke, as well as through the reports received by Livingstone, that the high mountains of the Walegga form a rampart on the west and south-west of the Mwutan, which must be cut through by the Lualaba if it should take its course to the lake, and through the lake to the Kir. The approach to all the western tributaries of the White Nile is also barred to the Lualaba by the Uelle, which Dr. Schweinfurth crossed in 1870 under 3° 37′ N. lat. and 28° 10′ E. of Greenwich, and showed to be a north-westerly flowing river, altogether south and outside of the basin of the Bahr-el-Ghazal.†

The reports of Von Heuglin, Poncet, and Schweinfurth agree in stating that the Uelle does not belong to the Nile system; Schweinfurth has made it at least very probable that the Sueh, which he crossed in 5° N. lat. and 28° 30′ E., is the upper course of the Jur; the Uelle could therefore only be identical with the Bahr-el-Arab if it did flow to the Nile: but, besides the assurance of Dr. Schweinfurth that he has convinced himself of the opposite conclusion, there

* *Stanley* in 'New York Herald,' 15th July, 1872.
† '*Geogr.* Mittheilungen,' 1871. Map 7.

is the strong fact that the Uelle, where Schweinfurth saw it in the middle of April, before the commencement of its rise, or at its lowest stage, carries a greater volume of water than the united streams of the Bahr-el-Ghazal, as will be seen by a comparison made further on. The point to which the Uelle flows, whether Schweinfurth's identification of it with the Shari is probable or not, is beside the question; this, however, may be noticed in passing, that, by reason of the time of its swelling, it can have no connection with the Congo, and that the somewhat earlier rise of the Shari is no ground for separating it from the Uelle, since the Shari may have other tributaries coming from further south.

Is it possible that the Uelle can be the continuation of the Lualaba? Dr. Schweinfurth's aneroid observations made during his Niam-Niam journey have unfortunately been for ever destroyed, along with his diaries, by fire, but his preliminary computation of these, made during the journey, gave for the Uelle an elevation of 2200, and later applied corrections 2300 English feet. Even admitting a possible error of several hundred feet, this observation is fatal to any continuation of the Lualaba into the Uelle, because the lowest point visited by Livingstone on the former river was separated from Schweinfurth's crossing-point of the Uelle by seven and a half degrees of latitude. Moreover in the neighbourhood of the place where Schweinfurth saw it, the Uelle is formed by two tributary or source branches, the Kibala and the Gadda, and the direction of both of these appeared to the traveller "decidedly to point for their origin, both to the Blue Mountains which Baker discovered in the north-west of the Albert Lake, and to those in the north of Tanganyika, which Speke recognised long ago as the most important water-parting of the continent."

The existing measurements of elevation place no hindrance in the way of a union of the Lualaba with other rivers of Equatorial Africa,—the Shari, Benue, Ogowai or Congo,—since the known portions of these rivers all lie considerably lower than the Lualaba of Livingstone. The Shari was crossed by Dr. Barth about 90 English miles above its mouth in Lake Chad, and although he gave no measurement of its elevation, yet it is evident, from the level character of the land, that its bed cannot at that point be much higher than the surface of the lake, the absolute height of which was found by Vogel to be 850, by Rohlfs 1100 English feet. The height of the Benue in Adamaua is given on Dr. Barth's map at about 800 English feet, but the aneroid observations made during Baikie's expedition,* giving only 268 feet for Odjogo, seem to show that the former estimate is too great. The Ogowai, at the confluence of its two main arms, is certainly not more than 300 feet above the sea, because one of its branches, the Ngunië, was found by Du Chaillu above the Samba Falls to have an absolute height of 347 English feet.

Unfortunately there are no measurements of elevation for the Congo, but it can hardly have any great elevation above the point where it breaks through the chain of coast mountains. Tuckey's expedition believed that the highest mountains near the Congo were probably not over 2000 English feet high;† the most important cataract has a fall of only 30 feet on a stretch of 900 feet of the river course, and through the whole extent of the passage of the mountains the river remains for the most part navigable.

(2) *Volume of the Rivers.*—If the hypsometrical data make a separation of the Lualaba and the Nile probable, this probability becomes a certainty on a comparison of the volume of water borne by the separate rivers. At the lowest

* Baikie, 'Narrative of an Exploring Voyage up the Rivers Kwora and Benue.' London, 1856, p. 540.

† Tuckey, 'Narrative of an Expedition to explore the River Zaire.' London, *1818, p. 351.*

point of the Lualaba visited by Livingstone (the market of Nyangwe, in 4° s. lat., and between 25° and 27° E. Gr.), its stream in July—that is in the dry season—was at the rate of from 1½ to 2 English miles an hour; the depth so great that men and women were drowned in it before the eyes of the traveller. The breadth of the river he gives at from 2000 to 6000 yards, or, in another letter, from 1 to 3 English miles; and to this he adds that the Lualaba could not be forded at any point, or at any season. Taking the minimum breadth of 2000 yards = 6000 English feet, the depth at 8 feet, and the current at 1¾ mile an hour (equal to 31 inches per second), the volume of water is 124,000 cubic feet in each second. Fortunately there exist measurements of the White Nile and its branches, taken during the season of lowest water, so that the figures are comparable with each other, and with those given for the Lualaba.

Peney found the Bahr-el-Jebel (the Kir, or river of Gondokoro) above Gondokoro, at the village of Tambur, 45 mètres broad, and, on an average, 5½ mètres deep, flowing at a mean rate of 85 mètres in a minute. Baker estimated the breadth of the same river above the mouth of the Asua (3° 34′ N. lat.) at about 400 yards in March; at Jebel Kuku its width is increased by islands, rocks, and slime-banks, to one English mile, and again, at one place, it is compressed to a breadth of only 120 yards. Speke gives no figures, but he calls the Bahr-el-Jebel above the mouth of the Asua a "noble stream." Petherick, on the 25th of April, or shortly before the rise of the rivers, measured the Bahr-el-Jebel above the mouth of the Bahr-el-Ghazal, and the Bahr-el-Abiad below the mouth of the latter; and from these measurements he was enabled to estimate the volume supplied by the Bahr-el-Ghazal.*

Placing these measurements beside those of Schweinfurth, made in the middle of April on the Uelle, we have the following comparison:—

	Breadth in English Feet.	Average Depth in English Feet.	Current per Second in Inches.	Cubic Feet of Water per Second in the Dry Season.
Lualaba at Nyangwe—Livingstone	6000	8	31	124,000
Bahr-el-Jebel above Gondokoro—Peney	148	17	56	11,700
Bahr-el-Jebel above mouth of Ghazal—Petherick	224	22	20	8,288
Bahr-el-Abiad below mouth of Ghazal—Petherick	481	14	20	11,330
Bahr-el-Ghazal—Petherick	..	..	..	3,042
Uelle in 3° 37′ N. lat., and 28° 10′ E. long.—Schweinfurth	325	12½	15	5,100

According to Schweinfurth's estimate, the channel of the Uelle at its very fullest, could only carry 17,850 cubic feet per second; and the vast superiority in volume of the Lualaba to the White Nile remains, even on comparison with the much higher results of the following measurements made, also in April, by de Malzac:—

* 'Proceedings of the Royal Geographical Society,' viii., No. iv., p. 122 *et seqq.*

	Breadth in English Feet.	Average Depth in English Feet.	Current per Second in Inches.	Cubic Feet of Water per Second in the Dry Season.
Bahr-el-Jebel	450	19	64½	45,600
Zerafa	49	6	14	350
Bahr-el-Jebel and Zerafa together	..	..	..	45,950
Bahr-el-Ghazal	587	5½	24	6,500

The Lualaba, then, bears at least nineteen times as much water as the Bahr-el-Ghazal, with which Livingstone would identify it, and not less than three times as much as the White Nile.

From these figures it is sufficiently clear that it is impossible for the Lualaba to be a tributary of the Nile. The accounts of the volume of the Shari and Benue are less satisfactory, and do not admit of any such decided contrast with that of the Lualaba.

The smaller western arm of the Shari, the river of Logone, was found by Barth at Karnak Logone in March to be, for the most part, shallow, in some places 8½ feet deep, with a stream of about 3 English miles per hour; the breadth was from 550 to 600 paces. In the middle of August it became much larger, and, though not so broad as the Shari, yet it had a strong current of from 3½ to 4 English miles an hour. The Shari itself, before its union with the river of Logone, was found to have a breadth of 2000 feet at Assu in March, and at Mele 1800 feet, with a channel 15 feet deep, and likewise a strong current. At the time of highest water the river sometimes overflowed its banks at the latter place, though these are more than 40 feet above its ordinary bed. Higher up, at Bugoman, the breadth was only from 1200 to 1500 feet, and the river had such a comparatively insignificant appearance that Barth at first took it to be a tributary: at this place also it appears to be, for the most part, shallow. In the middle of August the river at Assu showed a water-surface of at least 3000 feet broad; but this was broken up by numerous islands. The current was not greater than 3 English miles per hour, but the depth was so considerable that horses were forced to swim in crossing. In the month of September, when the waters are at their highest, the crossing is not attempted by the natives. The observations at Mele then give for the time of lowest water:—

	Breadth in English Feet.	Average Depth in English Feet.	Current per Second in Inches.	Cubic Feet of Water per Second.
Shari at Mele—Barth	1800	7½	60	67,500

Barth found that the Benue River, at the confluence of the Faro in Adamaua, was at least 1200 paces broad in the middle of June, and on an average 11 feet deep. The current proved itself so strong that Barth, in bathing, could not stand up against it (perhaps 3 miles an hour). The river had at that time fairly begun to rise; but, some months later, it was said to cover a point of land rising about 15 feet above its level, which separates it from the Faro. Judging from the evident marks on its banks, the Benue must often rise at least 50 feet. From these data a volume of about 198,000 cubic feet per second was calculated for the Benue, but, since the river was already consider-

ably swollen by the rains, a comparison of its volume with the previously noted rivers at their lowest stage, is not admissible.

Barth concludes, from the great and rapid rise of the Benue during the rainy season, that it must have its sources in mountains situated at no great distance inland, and the difference of its volume during the dry and wet seasons is so extraordinarily great that the river can hardly be supposed to flow from a great lake. Baikie is quite of this opinion when he says,* "The Bínuwé with more rapid course . . . . has more of the characters of a gigantic mountain-stream; . . . . originating in rocky mountain-ranges, it depends for its supply on the heavy falls of rain in elevated regions . . . . When the cessation of the rains dries up its sources, this river merely flows tranquilly along its sandy bed." Edward Vogel, who crossed it in April, 1855, reports that at that time the water was only 4 to 6 feet deep, and without any current.† The Faro, when Barth visited it, was 900 paces broad at its mouth, and not above 2 feet deep.

The doubts which these imperfect and indecisive data admit of, in respect to a possible connection between these rivers and the Lualaba, are of little import to the present investigation, since the impossibility of such a union is evident in comparing the time of periodical swelling in these rivers. On the other hand, our very imperfect knowledge of the volume of the Ogowai would be a cause of regret, since, at the time of its swelling, it approaches nearly to that of the Lualaba, if the description given by the travellers upon it did not assure us of this at least, that neither of the tributary branches of the Ogowai can bear any comparison with such a mighty stream as the Lualaba.

The united Ogowai is indeed, a noble river. Serval's survey of it proves it to have an average breadth of 8200 English feet, and a strong current, with a depth at the lowest stage averaging between 16 and 48 English feet; though, in some places, its depth decreases to 6 or 9 feet, at others increases to 65, and even 80 feet. The "Nazareth" branch of the delta pours out such a flood of water that, even in the dry season, the water at its mouth is fresh during the flood-tide.

The great breadth is, indeed, reduced by islands and sandbanks, and the depths given refer only to the main channel, which at times is narrow, and difficult to find. The *Pionnier* river-steamer, in which the various French Ogowai Expeditions have been undertaken, could only reach a distance of 90 English miles up stream in the dry season of 1862, on account of the shallowness of the water; and, when at the confluence of the main branches in 1867, was compelled to go about quickly on the beginning of the decrease of the waters, in order not to be stranded on the return-voyage.

The southern branch, the Ngunië, was found to have a breadth in Apono Land (2° s. lat.) comparable with that of the Thames at London-bridge, 700 feet, and was in June from 10 to 15 feet deep; in the rainy season about 10 feet deeper. Of more importance is the northern branch, the Okanda, and this one alone can be admitted into the discussion. Walker found this river, above the confluence, at the point where it changes in southerly direction for a westerly one, to be from 600 to 700 yards (1800 to 2100 Eng. feet) wide, though bare sandbanks occupied about one-half of its bed. Higher up its course where rapids interfered with Walker's boat voyage, the river-bed is filled with rocks, and though the current is considerable, the breadth decreases to 600 feet. No reliable calculation of the volume of its water can be made from such data, but this much is certain, that the Lualaba, an impassable river of from 6000 to 18,000 feet in breadth, cannot find room for itself, either in the channel of the Ngunië or of the Okanda.

* 'Reports of Dr. Baikie on the Geographical Position of the Countries in the Neighbourhood of the Niger,' &c., p. 7.

† *'Zeitschrift für Allgem.* Erdkunde,' vi., 1856, p. 486.

On the other hand the known Congo corresponds perfectly to the volume which the Lualaba must assume after its reception of the Quango and other tributaries. The Congo, as described in A. G. Findlay's Sailing Directions for the southern Atlantic Ocean (London 1855), "brings down an immense volume of water, which has hollowed for itself a narrow bed of very variable depth. In many places there is no bottom at 200 fathoms. Forty miles from its mouth its waters are only partially mingled with those of the sea, and sometimes nine miles out they are still quite fresh. . . . The main body of the stream of this mighty river is indicated by floating masses of bamboo, and débris of all kinds, which it carries far out to sea. The velocity of the current is said to range at from 4 to 8 miles an hour. . . . The stream of the River Congo is felt at a great distance out at sea, and ships which cross it in going to the North or to the South, ought therefore to guard against it. It is stated that 300 miles out the water is discoloured, and that the current of the river is perceptible at that distance."

Tuckey who has followed the Congo further than any one, found it, above the cataracts which it forms in breaking through the coast range, to have a width of from 2 to 4 English miles with an unbroken surface, and a current of from 2 to 3 miles an hour; and the statement made in his travels (p. xiv.) that at the lowest stage of its water, it discharges two millions of cubic feet per second, is confirmed by the more recent survey by Vidal. According to this survey * the river above Embomma (65 English miles from the mouth) has a regular channel, maintaining a uniform breadth for a long distance, only interrupted by a few very small islands.

Here, quite above the estuary, Tuckey found a current in the neighbourhood of the Diamond Rock, of 3½ English miles an hour, where Vidal's chart shows a width of 1½ nautical mile (9000 English feet), and a depth in the middle of the stream of 50 fathoms (300 feet).

Taking as a minimum only 10 fathoms of depth for the average, though that depth is shown quite close to the bank, and instead of 3½ only 2 nautical miles an hour for the current, we have for the

	Breadth in English Feet.	Average Depth in English Feet.	Current per Second in Inches.	Cubic Feet of Water per Second.
Congo	9000	60	40	1,800,000

The Congo is one of the giant streams of the globe; it surpasses the Mississippi very considerably, since by the exact measurements and calculations of Humphreys and Abbot † the Mississippi at Carrollton in Louisiana, in its channel of an average breadth of 2470 English feet, has 675,000 cubic feet per second as its mean volume for the year. This amount increases in March to 1,150,000, but sinks at the lowest stage of the water in November to 228,000 cubic feet; whilst the difference between highest and lowest water in the Congo is only from 8 to 9 feet, a proof that it is fed from great lakes. The Mississippi collects its water from a basin of 1,244,000 English square miles, but for the Congo there are at most only 800,000 square miles of drainage area available. If the basin of the Lualaba, to which, according to Livingstone's and Magyar's reports, the Kassabi or Loke (the Loeki or Lomame of Living-

* English Admiralty Chart, No. 625. Africa West Coast, River Congo, corrected to 1867.

† 'Report on the Physics and Hydraulics of the Mississippi River.' *Philadelphia, 1861.*

stone) is tributary, be deducted from this area, there would remain not more than 400,000 English square miles, an area which would not even suffice to form the Congo at its lowest state, since the rainfall of equatorial Africa (Manyuema Land) from Livingstone's observations during the rainy season of 1869–70, is not more than 58 inches; that is, not quite double as much as the average rainfall of the Mississippi region (30 inches).

Since then the Congo is the only river of Africa which in point of volume is capable of receiving the Lualaba, so, inversely, that inland river is necessary to account for the enormous volume of water which the Congo contains.

(3.) *Rainy seasons and the rise of the rivers.*

"The rainy season of a place within the tropics always begins when the sun has reached the zenith of that point. Then the trade winds, blowing regularly at other seasons, become gradually weaker, and at length cease and give way to variable winds and calms. The trade wind now no longer brings its regular supply of cooler, drier air; the rising heats and the calms favour an ascending current which bears the damp air into the upper regions of the atmosphere, there to be cooled down and to occasion the heavy downpours of each afternoon. The nights and mornings are for the most part bright and clear. When the sun moves away from the zenith, the trade winds again begin to be felt and bring with them the dry season of the year, during which hardly ever a cloud disturbs the serenity of the skies.

Between the tropical lines and the equator, however, the sun comes twice to the zenith of each place. If now between the going and coming of the sun, from the equator to its furthest range, a sufficient pause intervenes, or if the sun's temporary distance from the zenith is great enough, the rainy season is divided into two portions, separated by a lesser dry season. Closer to the tropical lines, where the sun remains but once in the zenith, the rainy season is a continuous one. The order of the tropical rains is thus as follows:

1. *The belt of calms*, with rain during the whole year, strongest in March and September, extending from 4° N. to 4° S. of the equator.

2. *The interrupted rains*, with rain at each period when the sun passes the zenith, extending from 5° to 15° of lat. in each hemisphere.

3. *The continuous rainy season*, during the time that the sun is in the zenith, extending from 15° to 28° of latitude."*

These conditions hold good as well on the sea as on land. The observations of travellers and resident missionaries in Africa, collected and arranged by A. Mühry,† show the most satisfactory agreement with this theory. The belt of calms here occupies, generally speaking, the zone between 3° S. lat. and 5° N. lat., becoming somewhat wider on the west coast: north and south of this the rainy season corresponds to the arrival of the sun in the zenith; it happens thus during our summer in the northern hemisphere, and in our winter in the southern. The swelling of an African river is, however, dependent upon the rains, and thus from the observation of the time of the increase, an indubitable conclusion may be drawn as to the climatic zone in which its sources or feeders lie. If a tropical river has its flood water in our summer, its sources cannot lie in the southern hemisphere, and inversely.

Applying this key to the present investigation, we can with the greatest certainty predicate that the Lualaba, which has its sources between 10° and 12° S. lat., will have its greatest volume in our winter, and will be at its lowest stage during our summer; for this truth, besides, we have Dr. Living-

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* Dr. J. Hann, in 'Allgemeine Erdkunde, bearbeitet von Dr. J. Hann, Dr. F. von Hochstetter und Dr. A. Pokorny.' Prag, 1872.

† "Ueber die richtige Lage und die Theorie des Kalmengürtels auf den Continenten: Afrika" ('Zeitschrift der Oesterr. Gesellschaft für Meteorologie,' 4. *Bd., 1869, p. 155 et seq.*).

stone's direct testimony. After he had discovered Lake Moero, through which the Lualaba flows, on the 8th November, 1867, and had travelled along its eastern shore to the town of the Cazembe, where he remained for forty days, Livingstone turned to go towards the Tanganyika in about January, 1868, but was compelled to return on account of the floods. "A native party came through and described the water as often thigh and waist deep, and sleeping-places difficult to find. This inundation lasts till May or June."

As Burton and Speke report that in the middle region of the Tanganyika the rainy season lasts from September to May, so Livingstone relates that on the Liemba, the southernmost part of the Tanganyika, from the 12th of May to September, 1867, no rain had fallen; and in Manyuema Land, west of Tanganyika, in about 5° s. lat., the full rainy reason began in November, and continued till July, although with intervals, marking the passage of the belt of calms.

In the following summary these accounts given by Dr. Livingstone relative to the Lualaba are compared with the previously available information on the periodical rise of the rivers under discussion, already in part collected by Dr. Barth.*

	Begins to Rise.	Highest Water.	Decreases.	Lowest Water.
NORTH—				
Bahr-el-Jebel at Gondokoro.	May, sometimes in February.	Aug. and Sept., sometimes even in May.	October ..	Jan. and Feb.
Bahr-el-Ghazal	.. ..	Aug. and Sept.	October ..	Mar. and Apr.
Uelle	April.			
Shari	March	September ..	.. ..	Jan. and Feb.
Benue	May	Aug. and Sept.	October ..	Mar. and Apr.
SOUTH—				
Ogowai	Sept. and March	Oct. and April	Nov. and June	July.
Congo	November ..	Dec. and Jan...	April	July and Aug.
Lualaba	November ..	January.		

This collection of actual observations shows that the river of Gondokoro, like the Ghazal, the Uelle, Shari, and Benue, have their highest water in our summer, and that therefore their feeders are mainly situated in the northern hemisphere, although the earlier risings of the Bahr-el-Jebel, and of the Shari, indicate that their basins extend into the belt of calms. The outflow of the Lualaba—which, on the other hand, has its high water in our winter—into any one of these rivers of the northern hemisphere is therefore impossible.

The Ogowai shows, by its plainly-marked double equinoctial times of high water, and by the season of its lowest state, that it has its tributaries in the belt of calms and in the region bordering on this to southward, not far from the equator. In this it offers a contrast to the Lualaba, not, indeed, so distinct as that of the Nile and Shari, but still very remarkable.

The Congo alone corresponds in the time of its rise with the Lualaba.

* 'Zeitschrift für Allgem. Erdkunde,' xiv., 1863, p. 101, Table.

(4.) *Concluding Remarks.*—From the foregoing discussion it does not absolutely follow that the Lualaba is a branch of the Congo, because it might fall into an inland sea or lake without an outlet. Since the President of the Geographical Society of London expressed this conjecture, English geographers have shown that an inland lake can hardly be supposed to exist in the damp equatorial zone, for the reason that the enormous volume of the Lualaba, as well as of the other waters which are tributary to it, cannot all evaporate. Such a lake would of necessity be a vast inland sea, a second Caspian at the least; but a sea of this size, with its surrounding drainage basin, would take so much from the area still to be disposed of (that is, not yet known) that no space in which the Congo could collect its giant waters would remain for it. As yet there is not the smallest evidence, not even a report, of the existence of an inland sea without outlet; the assumption of such a feature then seems quite superfluous, so much the more that all existing observations, as above noted, indicate a connection between the Congo and the Lualaba, and since the native reports confirm this view in many ways.

Livingstone himself learned from a native who had accompanied the Portuguese expedition to the Cazembe, that it was believed that the Luapula (the Lualaba before it passes Lake Moero) flows to Angola. Further, it was reported to him, that the great River Loeki (in position and name probably identical with the Loke or Kassabi) flows through Lake Lincoln to the Lualaba; that the latter, passing thence by Nyangwe, where Livingstone saw it (in 4° S. 25° E. Greenwich), reached a great unvisited lake with many inhabited islands, emerging from that to form great marshy lagoons.

Ladislaus Magyar,* who followed the Loke or Kassabi to a lower point than any other traveller, heard that this river takes an easterly direction in its lower course, and attains a breadth of several English miles; maintaining, however, the freshness of its waters, and becoming dangerous for navigation at some seasons of the year on account of its high waves. It is also reported to fall into a lake. This lake was thought by Magyar to be identical with the Nyassa, the only lake of East Africa known at that time by report; but his information agrees very closely with Livingstone's reports, as well with his latest description of the Lualaba and Loeki as with his former account of the connection existing between the Kassabi and the Congo.†

Magyar further states,‡ that "the Congo rises, as I have convinced myself by reports, in the interior of Africa, on the high plateau of Moluwa, under 5° and 6° S. lat., and 25° to 26° E. long. Greenwich, in the country of Lubá, in a swamp named Inhan-ha. Uniting with the many streams of this region, at a distance of about five days' journey (from the swamp), it becomes a deep though narrow river, which flows to westward, through a level country covered with dense forests, whose frequent streams coming from north and south are taken up by the river; then it bends north-westward, under the name Kuango," &c. Now we know, indeed, from Livingstone, that the sources of the Congo cannot lie in the given position, and that these must be sought much further to south-east; but the swamp of Inhan-ha may be the marshy lakes of Livingstone; and in any case Magyar's reports trace the Congo to the region which is included in the Lualaba drainage.

Taking everything into consideration in the present state of our knowledge, there is the strongest probability that the Lualaba is the head stream of the Congo, and the absolute certainty that it has no connection with the Nile or any other river of the northern hemisphere.

Through this certainty, and by reason of the discovery that the Tanganyika has nothing to do with the Nile system, the greatest problem of African

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* 'Geogr. Mittheilungen,' 1860, p. 230.

† *Ib.*, 1870, p. 192. ‡ *Ib.*, 1857, p. 190.

hydrography, the question of the Nile sources, is in the main solved. That Livingstone has indirectly given the clue to this solution, must recompense the great traveller for having missed the actual Nile sources in exploring the Congo.

Speke's views have been splendidly confirmed; the attacks of his opponents, specially of Burton, who was most inimically inclined towards him, collapse into nothing. Whether the Victoria Nyanza is one lake or several is a point of detail of less importance. The reports obtained by Livingstone, who can have no knowledge of what has been recently written on the subject, are, if anything, favourable to the *unity* of the Victoria N'yanza (Ukerewe, Ukara), because along with it he names only such lakes as were already known to have a separate existence from it.

The main point of interest, and the greatest gain from Livingstone's new explorations, is that we now know that the White Nile springs in 3° N. lat. out of the Mwutan (Albert N'yanza), which receives its main tributary from the Ukerewe (Victoria Lake). Its southern water-parting is formed, 1stly, by the Ulegga Mountains, rising to 9000 or 10,000 feet in the west of the Mwutan, and stretching southward as far as Manyuema Land (in about 3° s. lat.); 2ndly, by the mountains in the north of Tanganyika, which rise in Mount Mfumbiro, also to 10,000 feet; and 3rdly, by the plateau of Unyamwesi, so that no part of the Nile basin extends beyond 3° s. lat. At the western and south-western bases of the Ulegga Mountains, as well as to westward of the high land in which the Tanganyika is sunk, there begins a lower-lying plateau, rich in forests and streams, with a numerous population belonging in race to South Africa, separate and distinct from the inhabitants of the Nile valley and the east coast; with flora and fauna, which by characteristic types—the oil palm and the gorilla for example—ally themselves with those of the west coast.

Schweinfurth, as well as Livingstone, has crossed into this western interior region of Equatorial Africa, passing over the watershed of the Bahr-el-Ghazal to the basin of the Uelle; but the closer examination of this newly opened region of Africa may be left for another paper, in which its features will be treated of in connection with Dr. Livingstone's latest journey.

The most important goal of African research is now undoubtedly the Congo; it appears in very truth to be the "Moienzi Enzaddi," as the natives named it, to Captain Tuckey, "The Great River," the river which swallows up all the others. The supposition that he might after all be on the Upper Congo seems to have often arisen in Livingstone's mind; and he says bitterly, "Who would care to run the risk of being put into a cannibal pot and be converted into blackman for anything less than the grand old Nile." Now, however, that through Livingstone and Stanley the last doubts of the accuracy of Speke's views are set at rest, the Congo remains the most worthy, the most promising, object of African exploration.

Mr. F. Galton said that all who had taken an interest in the progress of African discovery must feel delighted that the Congo was at length to be explored. The paper that had just been read seemed to be convincing in most particulars, but somehow it missed an important point. He did not think it proved its case. It stated that the rise of the waters of the Congo must be due to the rise of the Lualaba, because the risings were nearly simultaneous. The fact, however, was that the Congo rose before the Lualaba, namely in September, while the latter rose more than a month later, namely in November, and it would require an additional fortnight or three weeks for the rise in the latter river to be felt 500 or 600 miles off in the Congo. Another peculiarity of the Congo was that it commenced to rise before the rains reached its mouth, although that part of it is more to the north than

are the known parts of the Lualaba. Captain Tuckey found that it rose in September when the sky was only slightly overcast, and the actual rains did not begin till a fortnight or three weeks later. This fact seemed indubitably to point out that the water in the river came in some degree from the country to the north of its mouth, and was easily accounted for by supposing that the Lualaba took a sweep northward before it became the Congo. The later rise of the Lualaba would then cause the continuance of the rise of the Congo, whose long period of high water was one of its peculiarities. The connection with the Lualaba could not account for its early rise unless there was a northern bend.

Mr. FINDLAY said, according to all accounts, Tanganyika was a freshwater lake and must have an outlet, although none had as yet been discovered. It was a singular coincidence that he should in 1867 have made it exactly the same elevation as Livingstone, and also the same as that of the Albert Nyanza, but the elevation of Sir S. Baker's Lake was not as yet quite decided. He had thought that a small error in the observations might have slightly still raised the Tanganyika, and thus raised the Lualaba and the unvisited lake, and that a correction of that error might make the two lakes to coincide; but, after due consideration, he had given up that opinion on account of the dates of the rising of the waters and the comparison of the volumes. The rising of Tanganyika was identical with that of Albert Nyanza, and, therefore, although the northern end was closed, he did not think the question of the disposal of the waters of Tanganyika was yet settled. No doubt the southern end, too, had been closed by Livingstone's explorations. Nothing was known of an eastern outlet, and it would be very singular if there were one, because it would be in opposition to the course of the Malagarazi. Mr. Stanley stated that he heard the sound of a large waterfall (or surf) on the western side, which could not be far from Ujiji. It might be that there was an outlet on that side to Baker's Lake. It was to be hoped, however, that the whole question would be soon settled by exploration, and thus render speculations unnecessary.

Colonel GRANT said he regarded the separation of Livingstone's discoveries from the source of the Nile as a great triumph for his late companion Captain Speke. Some four or five years ago, Livingstone wrote home to say that he had come upon the source of the Nile in 10° or 11° S. latitude. He (Colonel Grant) had, however, felt convinced that these sources of Dr. Livingstone had nothing whatever to do with the Nile, and the despatches which had lately reached England confirmed him in this opinion; namely, Livingstone mentioned having seen the skulls of gorillas, that the women of Manyuema, or near there, dive in the water and bring up oysters, et cetera; but throughout Captain Speke's journey, the gorilla was never once met with, though heard of to the west of it; such a custom as the women of the Nile region diving was never seen nor heard of, and oysters in the centre of Africa are of course an impossibility, although large bivalve shells of a new species were brought home from Tanganyika by Speke. Another remarkable custom is related in Dr. Livingstone's letters, that the inhabitants about Manyuema domesticate pigs: this at once indicates a strange race; for though the people of Nile-land hunt and eat the wild boar, they do not keep it in a tame state, and the Mahomedan races far down the Nile are forbidden by their religion to defile themselves with this animal. If a reference be made to Captain Tuckey's Travels on the Congo, these customs of women diving and the domesticating of pigs will be found recorded. From these facts he (Colonel Grant) had formed his opinion that Speke's Nile was distinct from Dr. Livingstone's discoveries, and, since hearing the paper of to-night giving the comparison of the Lualaba and Nile volumes of water, this opinion received additional confirmation. He protested against the new form of three lakes given to the Victoria Nyanza

in the two maps before the audience, as Dr. Livingstone's recent explorations had not extended to it, and certainly proved the accuracy of Speke's observations on the Tanganyika Lake; namely, though Burton and Speke did not arrive at the extreme north end of Tanganyika, Speke made the river run into the lake because mountains surrounded its northern shore. Livingstone and Stanley have confirmed this geography. Who, therefore, was the real discoverer of the waters flowing into the lake, Livingstone, or Stanley, or Speke? As regards the Victoria Nyanza being one body of water, he felt convinced that future explorations would prove it so; for though Speke himself did not go round more than one half of it; still they saw its boundless surface, its sea-horizon, the moon rising out of the lake, and no native had ever crossed it, and none knew what races lived upon its opposite shore.

The Rev. HORACE WALLER said the intelligence that an Expedition was about to start for Western Africa would be new to the public generally. Dr. Livingstone's old friend, Mr. Young, whose great generosity had enabled them to prepare the Expedition, had entered into the subject very closely, and the real object of his making such a liberal gift was to relieve and help Livingstone, whom he considered to be entangled in the middle of the country with an enormous quantity of water to deal with, and for the moment not knowing which way to turn to look for the outflow. These were times when it was best to be candid and speak out, for to some people it might seem that the Society was going to take advantage of what Livingstone had stated in his letters, and to claim for itself new discoveries and new glory. Nothing, however, could be further from their intention, or from the intention of Mr. Young in making his gift. The Expedition was solely and wholly to aid Livingstone in his discoveries, and they were most fortunate in securing the services of a gallant naval officer to whom the subject under consideration had long been a matter of careful study, and who was willing to go out as the lieutenant of his commanding officer Dr. Livingstone. Whether he met him or not, whether he was able to trace the Congo to the Lualaba or not, he would, on his return, lay the account of his discoveries before the Society, and offer them as a contribution to the labours in which Livingstone had been so long engaged in Central Africa. It was a matter for thankfulness that at last public interest was aroused with regard to Central Africa, and if Livingstone could know that those letters, which had reached England owing to Mr. Stanley's determination and courage, had really been the means of crushing out the slave-trade, he would feel a young man again. It was a matter of surprise to many, that with so many young men with large fortunes in England—men fond of exploring, fond of sport, and with glory enough to be obtained—so few were found to visit Africa. He hoped that the work now begun would be carried on, and that there would be a steady flow of explorers from England. There was no danger in exploring. The only danger was in standing still, and, as a matter of fact, hardly one man had lost his life whilst busily carrying on explorations.

The PRESIDENT proposed a vote of thanks to Mr. Young for his noble gift. Undoubtedly his object was the relief and support of Livingstone, and it was entirely in accordance with his views, and in deference to his wishes, that the Society was going to send out Lieutenant Grandy. They did not intend to arrogate to themselves any credit for originating the Expedition, or utilising the fruits of it; but they trusted it would be of service to Livingstone, and any contributions which might be gained to geographical knowledge would be gratefully received.

Second Meeting, 25th November, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Henry Acland, Esq.*, M.D.; *William Adams, Esq.; Thomas Allen, Esq.; Jonkheer J. W. Ploos van Amstel, Esq.; Maurice Ansell, Esq.; A. Henry Baynes, Esq.; Richard Bird, Esq.; Charles W. Blundell, Esq.; Major O. Y. Burne; J. Cordy Burrows, Esq.; Robert Campbell, Esq.; William Campbell, Esq.; John Carfrae, Esq.; Edward Cattley, Esq.* (Member of the Imperial Geographical Society of St. Petersburg); *Samuel Chatwood, Esq.; Rev. C. C. Coe; Lieut. J. James Curling*, R.E.; *Rev. H. M. E. Desmond; Alexander Forrest, Esq.; Colonel P. F. French; A. Edward Griffiths, Esq.; Walter Hamilton, Esq.; John Ogilvy Hay, Esq.; Clement Hill, Esq.; Henry Hoare, Esq.* (Banker); *Lieut. Sydney A. Holt*, R.N.; *John Hudson, Esq.; Edward Hutchinson, Esq.* (Secretary to the Church Missionary Society); *A. F. Jeffreys, Esq.; Alexander Kerr, Esq.* (Banker); *Braham La Mert, Esq.; J. J. Mackenzie, Esq.; Colonel Malleson; William Aug. Mitchell, Esq.; Captain James L. L. Morant* (Royal Madras Engineers); *G. S. D. Murray, Esq.; John Murray, Esq., Jun.; George Naylor, Esq.; Frank Oates, Esq.; Captain Rudolphus Oldfield*, R.N.; *Edward Parry, Esq.; H. Rees Philipps, Esq.; Sutherland R. Philipps, Esq.*, M.D., &c.; *William Henry Plaister, Esq.*, M.R.C.S.; *Samuel Proctor, Esq.; William Robinson, Esq.; A. V. N. Row, Esq.; P. Ryan, Esq.; Lord Sandhurst* (Commander-in-Chief in Ireland); *Admiral F. Beauchamp Seymour* (Lord of the Admiralty); *A. Joseph Skilbeck, Esq.; William A. Smaith, Esq.*, LL.D.; *William Snooke, Esq.; Walmsley Stanley, Esq.*, C.E.; *Richard von F. Treuenfeld, Esq.; Captain Campbell Walker* (Madras Staff Corps); *Edmund Waller, Esq.; Rev. Edmond Warre; Henry Cecil Watts, Esq.; Commander J. C. Wells*, R.N.

PRESENTATIONS.—*A. Joseph Skilbeck, Esq.; Edmund Waller, Esq.; George Parker Webb, Esq.*

ACCESSIONS TO THE LIBRARY, FROM NOVEMBER 11TH TO NOVEMBER 25TH, 1872.—'Account of the Island of Bulama, West Coast of Africa, 1794.' 'Voyages to the Coast of Africa by Saugnier and Brisson, 1792.' 'West India Commonplace Book, 1807.' Wadstrom's Essay on Colonization, West Coast of Africa.' Edited by Dickson. 1794. 'Description of the Island of Jamaica.' By R. Blome. 1672. 'Carribbeana.' Letters, &c. Two vols. 4to.

Donor D. Hanbury, Esq. 'How I found Livingstone.' By H. M. Stanley. 1872. Purchased. 'Dissertation on St. Paul's Voyage from Cæsarea to Puteoli, &c.' By W. Falconer, with Notes by T. Falconer. 1872. Donor T. Falconer, Esq. 'Journey from Orsk to Khiva in 1740.' By Glaaschef and Muravin. Edited by Khanykof in 1857. Resumé by R. Michell. Donor the India Office. 'Russian Mission, in 1870, to Bokhara.' By Captain Kostenko. Described by R. Michell. 'Did the Oxus ever flow into the Caspian?' 'Letters from Kokand.' By A. Fedchenko. Translated from the Russian by R. Michell, Esq. Donor the translator. 'Correspondence, &c., on the Looshai Raids, 1872.' (Parliamentary Paper.) Donors the India Office.

Accessions to Map-room since the last Meeting of November 11th, 1872.—Stieler's Hand-Atlas. Parts 6, 7, 8, 9, 10; containing 15 maps. Spruner-Menke's Hand-Atlas. Historical: Parts 5 and 6; containing 8 maps. Presented by Justus Perthes, of Gotha. Two Maps of the route taken by Captains Speke and Grant in their African Exploration of 1864. Presented by A. G. Findlay, Esq., F.R.G.S. Four Pamphlets on Topographical subjects by Augustus de Tôth, Colonel of Honveds, Buda. Presented by the author. Twenty-six Specimen Maps of Prussian Surveys, for exhibition. Presented by Colonel Zimmerman, Chief of the Topographical Staff, Berlin.

On taking the Chair, the President said he was happy to inform the Members that, since their last Meeting, he had received a note from Mr. Young, stating that he was glad to hear that preparations for the Livingstone-Congo Expedition were going on, and adding, "Herewith I send you a cheque for 2000*l*. Please acknowledge." They had thus been enabled to make their preparations with such efficiency and rapidity, that Lieutenant Grandy would leave England during the present week for the West Coast of Africa. Her Majesty's Government had given every assistance in their power. The Foreign Office had furnished letters recommending Mr. Grandy to the officers surveying under its orders on the West Coast of Africa, and the African Steam Company had offered to convey the Expedition to Sierra Leone at half the usual rate of passage. The War Office, too, to whom application was made for the loan of arms, had made them a present of the arms required for the native escort. Lieutenant Grandy, therefore, would start under very favourable auspices. He had had considerable experience on the West Coast of Africa, and would receive such assistance as could be afforded by the Portuguese authorities on the spot. Of course much must depend upon circumstances as to the rapidity with which he would be able to penetrate into the country, and the direction which he would take; but his first object would be to strike the Congo somewhere above the rapids, and from thence to follow the river as far as possible into the interior; and if Livingstone succeeded in descending the Lomame, Lieutenant Grandy might hope to meet him somewhere near the unknown lake which Livingstone had reported on hearsay, about the end of next year. Under any circumstances, however, Lieutenant Grandy would *endeavour to* ascend the Congo, and, if he met Livingstone,

would give him every possible assistance. The other expedition, from the East Coast, would be placed entirely under the direction of Sir Bartle Frere. This expedition, composed of Lieutenant Cameron and Dr. Dillon, would leave England this week and join Sir Bartle Frere at Brindisi, from whence they would proceed in the *Enchantress* to Zanzibar, where Sir Bartle Frere would issue final instructions to the expedition, and start it for the interior. Relying, as the Society did, on his long experience in dealing with Asiatics, and also on his known attachment to Livingstone, they had every confidence that he would take the most effective steps towards rendering this expedition an important auxiliary to Livingstone. On the officers themselves the Society relied with equal confidence. Lieutenant Cameron had been intent on this expedition for more than a year; and he had now an opening, which he would, no doubt, well avail himself of, not only for his own credit, but for the advantage of science, and for the good of Dr. Livingstone.

The following papers were then read:—

1. *On the Garo Hills.* By Major H. H. Godwin-Austen, F.R.G.S.

[Abstract.]

In a brief introductory notice the author described the position and direction of the ranges south of the Assam Valley, of which the Garo Hills form the western extremity. Ascending the Brahmaputra from the delta, the Garos are the first hills met with; but, although representing an area of 2300 square miles of British territory, the extreme unhealthiness of the climate and the difficulties in the way of transport have rendered them hitherto almost impenetrable to Europeans, and no British officer had ever succeeded in crossing from the plains of Mymensing to those of Goalpara.

The tribes of the Garos and Khasi are separated by a strip of dense forest and jungle, about 18 miles in breadth, situated along the meridian of 91° E. longitude, inhabited by a small clan, called Migams or Langams, speaking a language of their own, but partaking of the characteristics of both tribes. In the autumn of 1869 Major Godwin-Austen, finding little prospect of obtaining assistance on the Cachar frontier, determined on devoting his whole attention to the unknown area west of 91°, and to extend the triangulation along the southern face of the Garo Hills.

The heavy baggage was to go by water to Shushang, on the Sumessary, while Major Austen, accompanied by Lieutenant Beavan, proceeded to take up the triangulation from the points left off at in the previous seasons. The hills are well seen from Laor, the valley of the Um Blay marking the lowest point in the range.

At Puna Titn, a small Khasi village at the junction of the Um Blay with the Rilang, they succeeded in obtaining twenty men, in addition to the porters already engaged, and at an adjacent village a supply of peculiarly shaped axes, specially adapted for jungle clearing, and doing excellent work in the hands of the villagers,

most of whom are expert woodsmen. An extensive bazaar is held at Puna Titn, dried fish (sukti) forming the principal article of barter.

Crossing the Um Blay, a course was followed nearly due west over the lower plateaus of the Garo Hills, here intersected by shallow watercourses flowing south, and discharging their waters by fine cascades into deep gorges covered with dense forest vegetation. Ascending the Nonkulang ridge to an old station of 1866, of which few traces remained,—the clearing being now covered with jungle of great height, shutting out the view on all sides,—camp was at once formed on the site of the old village, which in 1866 was a substantially built one of some twelve houses, but now a mere collection of grass-covered ruins, the inhabitants having migrated further west.

The 24th and 25th of December were occupied in re-erecting the platform for observations, and men were started off to set up marks on neighbouring peaks. Leaving Lieutenant Beavan in charge, Major Godwin-Austen started off to meet the head-quarter camp from the Mymensing district, crossing the Gonassery, south-west to the "hath" or market-place of Nazirpur, which he reached on the morning of the 28th. From here a fine view was obtained of the majestic peak of Kylas, tne highest point in the whole range of the Garos, called by the natives the "Holy Hill," and by them held in great veneration. Many wild legends and rumours were current among them concerning the impracticability of its ascent. In spite of this and the opposition he expected to meet with on the part of the Garos, Major Austen decided on making it the point of a trigonometrical station, and, after a cursory examination from the plains, determined on attempting an ascent from the extreme western side, promising the natives that they should "soon see his heliotrope flashing from the summit."

The market-place of Nazirpur lies about five miles from the base of the hills, and is resorted to largely by the Outer Garos; the Interior Garos, trusting entirely to their outer neighbours for such luxuries as they may require, transmitting their own cotton to the plains by the same means. Being centrally situated, and offering many advantages for obtaining supplies, it was decided on establishing there the first head-quarter camp; and the main camp from Mymensing, under Mr. Belletty, arriving soon after, preparations for triangulation were quickly commenced. Parties were started off under Messrs. Belletty, Doran, and Atkinson, to clear adjacent hills, and with plane-tables to sketch in the intermediate ground; while, on the 6th January, Major Godwin-Austen, in company with the

collector of Mymensing, proceeded on elephants to reconnoitre the open grass country to the north-east, selecting a spot near the village of Lukhipur as the site for a station, and one was erected there on the 10th.

Much valuable time was now lost through the illness of Lieutenant Beavan, who was brought into camp from the station at Nonkulang suffering from combined fever and sunstroke, Major Godwin-Austen being compelled eventually to invalid him to Calcutta, and complete that portion of the work himself. By the 15th all was ready for the trip to ascend and clear Kylas; on the afternoon of that day, bright sunshine and clear, they marched across the open level country and reached the gorge of the Gonassery about dusk, forming their first camp at a Garo village well within the hills.

Pushing on due north up the bed of the Gonassery, through the village of Kūnchūng, where guides were procured, the next day reached its junction, with the Rūngnū flowing in from the east. Ascending a steep escarpment of granite, rising quite 400 feet from the river-bed, they found themselves on a plateau of about a mile in breadth, extending to the foot of another and last rise in the hills. Chickmung, their next halting-place, consists of some four villages lying round about Kylas, inhabited by a clan of Garos, differing in many respects from the tribes surrounding them. They were exceeding loth to render assistance, but after some trouble two guides were obtained, and four men started back to the plains for a fresh supply of provisions, &c. Continuing the march and crossing the head of the Gonassery, they soon after reached the watershed of the Kylas ridge.

Failing, both by bribes and entreaties, to obtain information from their new guides as to the nearest path to the summit, Major Godwin-Austen, with ten men under his command, after some labour succeeded in making his way up the western flank of the peak, landing at length on its rather level main ridge, previously sending off a similar body of men, under his Naik, to find a path in another direction.

A spot was soon selected, from which a splendid view was obtained of the surrounding Trigonometrical Stations, the Sumessary flowing immediately beneath them, and return made to camp, having put an end to all the absurd superstitions of the people concerning the inaccessability of Kylas.

The next day another ascent was made, and a point attained higher than that of the previous evening. Here preparations were made for erecting a station; a number of angles were taken to natural objects for Tertiary points, and vertical angles observed to two or

three of the principal stations, from which the heliotropes were flashing brilliantly.

The four following days were occupied in observing and clearing; but on the 23rd, the work being completed, they returned to camp in the forest below, and thence retraced their steps to Chūkmūng.

Tigasin, about 16 miles due east of Kylas, and lying on the edge of the steep northern slope of the main sandstone ridge, was the next station to be visited, the way lying across the head of the Mahadeo Valley and through the village of Nongmen. On reaching Tigasin it was found impossible, without incurring great expense, to clear the forest intercepting the rays to Kylas and Marang Thang. It became necessary, therefore, to erect a "maichan" or platform, built in the crown of the highest tree or commanding hill-top, sometimes at an elevation of 120 feet from the ground, and ascended by a ladder formed of straight saplings lashed on to the trunk with cane. These "maichans" can be erected in a few hours, requiring only the felling of the nearest trees and the lopping off of the top boughs beyond, to open up the surrounding stations, and form a most rapid and effectual method of mapping a forest-clad country. Pundengroo, another high scarp on the Kylas Range, was found impracticable for a theodolite station, the tree selected by Lieutenant Beavan being found unsuitable for the purpose. Descending from the watershed, down the valley of the Rong-siang, they returned to the plains below, and skirting the base of the hills, encamped on the 29th at the Bengali village of Pang-gam, lying at the foot of spurs thrown off from Marang Thang (1389 feet), the highest point on the spur from the main range at Pundengroo, and the next station to be visited; but, in consequence of the haze that prevailed, it was not until the 7th February that the work could be accomplished.

Major Godwin-Austen, having now connected the triangulation between Kylas and the stations of previous seasons lying due east, left Pang-gam with his party and made his way westward over the plains, crossing the Gonassery until he reached Shūshang, on the Sumessary, where, as previously mentioned, the heavy baggage had been forwarded by water. It now became necessary to shift this main camp from Shūshang to a point on the river well within the hills at Agarkote, prior to attempting a passage across the entire block of hills into the plains of the Brahmaputra.

Marching northwards up the valley of the Sumessary until they reached the gorge formed by the steep western face of Kylas on the east, and the spurs of the Tura Range on the west, camp was formed at the village of Rywūk. From here a N.N.W. course was taken, by way of *Baduri*, *Dorengo*, and Lenksram, villages lying on the

northern slopes of the Tura Range, taking numerous observations on the way, and striking the Sumessary (which here makes a bend to the east) about 25 miles from where they had previously left it. On the evening of the 19th they reached Dáwá, close under the hill of Munghri, which it was thought desirable to clear for a Trigonometrical Station, and a party was left for that purpose. Near this was a vast expanse of open country, with a mean elevation of 1200 feet, forming an interesting physical feature, without a counterpart in the adjacent extension of hill district.

At Norek, the next village on the line of route, they experienced great difficulty in obtaining guides, meeting with strong opposition on the part of the "Mundals" or headmen of the Outer villages, but finally succeeded in shaming them into showing the way by the southern road to Rangap, where they made their first acquaintance with the Interior or Independent Garos, who showed every desire for an amicable relationship—an example followed by the headmen of the surrounding Interior villages. They were thus enabled to start their unwilling guides back to their homes.

Leaving Rangap and pushing south through Bong-kong Giri, they again struck the Sumessary, here called the Shemshang. Near its junction with the Chibok, one of the large feeders flowing into it from the northern slopes of the Tura Range, lies the village of Negmundal, the headman of which place agreed to take them on to the large animal-market of Surramphang, where large numbers of dogs are bartered to fatten for food. Thus one of the objects of the expedition, viz. to discover and fix the position of this place, was accomplished with little difficulty.

Having now reached their farthest point westerly in the very heart of the Garo Hills, it was thought advisable to retrace their steps eastwards, the party not being strong enough to withstand any sudden rise of these people, of whose character little was known. On February 25th they again arrived at the station near Munghri, which was by this time sufficiently cleared for purposes of observation.

From here the party proceeded in a north-easterly direction, and, crossing the spurs of the hills enclosing the Sumessary on the north, struck its chief northern tributary, the Rūnjūt, up whose valley they ascended until they reached the top of the high ridge forming the watershed, between the Sumessary and the Brahmaputra. Crossing this ridge and following about 5 miles down the Chichira, a tributary of the last-named river, they made their most northerly camp near the village of Gābul, in about lat. 25° 42′ N., long. 90° 50′ E. Major Austen and Mr. Williamson pushed on from here

to the village of Mejolgiri, lying near the plains of the Goalpara district, from whence supplies were expected for the return journey.

These supplies coming in soon after, on the morning of March 2nd the party started on their homeward route, following a line nearly due south along the meridian of 90° 50′ E. over entirely new ground until Kylas was again reached. An attempt to obtain supplementary angles from its summit was foiled by the density of the atmosphere, caused by combined haze and the smoke of jungle-fires.

On the 8th they arrived at their old camp at Rywūk, thence proceeding by rafts down the Sumessary to Nazirpūr; thus completing what proved to be a most interesting and pleasant trip during an absence of two months.

The paper will be printed entire in 'Journal,' vol. xlii.

Sir Cecil Beadon said it was a remarkable circumstance that, until about six years ago, no attempt had ever been made by the Government of India to exercise its undoubted jurisdiction over the inhabitants of the Garo Hills, although the whole country surrounding those hills had been under regular government for a very considerable period. The district of Mymensing to the south and west had been under British rule from the earliest occupation of Bengal. The reasons for this failure to exercise its rights were twofold: first, the extreme unhealthiness of the country, at all events of the valleys and those parts which it was necessary to traverse in order to get into the interior; and next, the savage character of the inhabitants. In the year 1824, shortly after the acquisition of the Valley of Assam, Mr. David Scott, one of the first English Governors in Assam, made some attempts to civilise the Garos, and established certain relations with some of the tribes. He also penetrated a short distance into the country, and built himself a house on the top of one of the hills, in the same spot now occupied by the British officers who administer the Garo Hills. Some of the chiefs agreed to give a small tribute in acknowledgment of British suzerainty, and to submit disputes between different tribes to the arbitration of the British officer. Those, however, who entered into this relationship bore but a small proportion to the main body of the Garo people, and, in fact, comprised merely a few chiefs who occupied villages in the immediate neighbourhood of the more settled districts. From that time down to 1865 or 1866 very little progress was made in the civilisation of the Garos. They were even seldom heard of except when some of them would make a raid into the adjoining plains. They generally signalised those raids by beheading all the people they could lay their hands on, and carrying away the skulls as trophies. The origin of those raids was generally the oppression of the zemindars, who claimed a certain jurisdiction in the hills and a right to collect certain revenues from the Garos. The result of appointing a British officer to administer the government of the hills had been very successful, and from 1867 till the present year not one single raid occurred. Not long ago, however, a raid was committed by some of the more eastern Garos in the direction of the Khasia Hills, and the Government was about to send an expedition into that part of the hills to punish the guilty tribes. A surveying party had been attached to that expedition, and the result no doubt would be to increase our geographical knowledge of the country. Very little was known of the Garos or of their language, but he believed that they had a closer ethnological relation to the tribes inhabiting Central India, the Gonds, and in the extreme west the Bheels, than with their immediate neighbours to the east, the Khasias, who were much more of a Chinese type than the Garos. It was

supposed by some geographers that at a remote period the Garo Hills were connected with the Rajamahal Hills, the geological formation of the eastern spur on the one side being similar to that of the western spur on the other side, and that they became separated by the action of the Ganges gradually forcing its way through. Whether that theory was correct or not, it was certain that the Garos bore a closer ethnological relation to the inhabitants of the Rajamahal Hills than to the Khasias, who evidently derived their origin from a Chinese source.

General R. STRACHEY said it was a most astonishing thing that in the year 1872, after the British Government had been established in Bengal for more than a century, there should be a district at no greater distance from the capital of British India than York was from London, regarding which nothing was accurately known. The very Governor of the province of Bengal, who of all men in that room ought to be able to give information respecting the Garo Hills, had stated that he knew nothing about them. It was, therefore, evident that Englishmen in India had not attended to the requirements of science as they ought to have done. This was in great contrast to the action of the Russian Government in Central Asia, for although they had only had possession of Samarkand a few months, they had already established an observatory there. How many observatories had the British Government established in India? More was known of the physical character of the most remote parts of the Russian Empire than of many parts of British India which had been under British rule for nearly a century. He did not find fault with people acting according to their lights, their knowledge, or their ignorance, but he hoped that in future a little more attention would be paid to scientific subjects by the Government of India.

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2. *The Lushai Expedition.* From REPORTS of the SURVEYORS.

DURING the cool weather of 1871–72, two survey parties were employed, with the two columns forming the expeditionary force against the Lushais, on the eastern frontier of Bengal. The right, or Chittagong party, advanced from the south, under Major Macdonald; while the northern party, under Captain Badgley, started from Cachar on the north; and both have added much to our previously slight knowledge of this unexplored border-land. Both parties had to overcome great difficulties in forcing their way through dense jungle and over rugged hills, and they succeeded in mapping a vast extent of new country. The two parties, one coming from the north and the other from the south, approached very closely, overlapping each other in latitude; but a gap of 40 miles in longitude was left when the two columns returned.

The southern party, under Major Macdonald and Captain Tanner, were in the field from November 16th, 1871, to March 24th, 1872, when the troops were withdrawn from the country. The region traversed by the southern column consists of parallel ridges, inhabited by the Syloo and Howlong tribes. The most western ridge, called Rhaeejan, is about 3000 feet high; and the ranges

gradually increase in height up to 6000 feet in the Shindoo country. One distant peak, 50 miles away to the east, was found to be 8000 feet high. Major Macdonald describes the whole country, when seen from any commanding point, as looking like a series of great mountain waves in a sea of forest, dotted here and there with broad patches of yellow light, which mark the cultivation. The upper valleys of the Syloo country are drained by the rivers Suhjuck and Kurnafoolee flowing to the south, and the Foot Doong and Kloong Doong flowing north into Cachar. The Kurnafoolee drains the whole south country, and formed the base of communication between the advancing column and the sea, with water-carriage to a point at the foot of the Syloo Hills. The mountains are composed of soft sandstone and clayey loam, cut up by precipitous ravines, with rank and dense vegetation, owing to the country being clothed in mist during many months of the year; while the summits are clothed with forest. The ridges are generally traversed by footpaths of the Kookies and other tribes.

Captain Tanner thus describes the march of the right column up the deep valley of the Foot Doong stream, between two of the parallel ridges:—

7th February, 1872.—Accompanied by Mr. Barrett, I marched from Savoonga's village to the Lal Ngoor Post. The descent from Savoonga's Hill to the foot of the range is very steep, and it is strange that no attempt was here made to stop our advance when proceeding against that chief in January. From the foot of the hill the track runs for several miles along the rocky bed of one of the feeders of the Foot Doong stream, in which we passed some well-concealed Kookies' ambuscades, whence they had on two or three occasions fired without success on the postal and Coolie escort. The Foot Doong, which has been an altitude of 900 feet above sea-level, is locked in between high and exceedingly steep hills, clothed to the foot with very dense jungle. We noticed several magnificent specimens of the Himalayan tree-fern, some of them from 20 to 30 feet high, besides orchids of singularly luxuriant growth, which appear to thrive particularly well in this damp and secluded locality. The ascent from the Foot Dong to Lal Ngoor's village is gradual, the road passing over an ingeniously-made Kookie bamboo-bridge which is thrown over a deep ravine in a very skilful manner. It was at the foot of Savoonga's Hill that we were overtaken by evening when marching against that chief on the 11th of January. The force had toiled along since early morning, making but slow progress over the green slimy boulders, and through the deep pools of the stream in the bed of which for many miles our route lay; and at five o'clock, finding that we seemed to be penetrating farther and farther into the valley, from which there appeared no prospect of finding an outlet, and having as usual but the most imperfect idea of the direction in which to proceed, or of the distance yet to be traversed, the General determined to halt. Our position was most confined: high steep hills rose abruptly from the stream, and appeared to wall us in on every side. The small available space for encamping was literally choked up with a network of canes, bamboos, and creepers. Evening shadows were already creeping up the peaks above us, and deepening the gloom of the thick woods, with which we felt as *it were stifled, and which,* even at mid-day, scarcely admitted a single gleam of

sunlight. One by one the companies began to arrive, and were halted at the positions they were to clear and occupy for the night. Slowly and without noise the force collected. Little was spoken, for in our marches in these forests, we had, to a certain extent, learnt the value of silence; military words of command had been abandoned for signs, and for orders given in an undertone. The word was presently passed to clear the encamping-ground, and then, suddenly, as if by magic, all was change; nearly a thousand kooleeries, dâhs, and axes, vigorously plied in the jungle, awoke echoes in the woods and valleys which must have been quite sufficient to frighten away any force that Savoonga might have watching us or waiting for us. The canes went down, the huge fallen dead trees were splintered away and carried off for firewood, and the bamboos were quickly formed into huts, which the Sepoys had begun to learn to build from the Burmese and Chukma Coolies. Before an hour had passed we were all housed, and the place lately occupied by tangled trailing vegetation, never before disturbed, had now been transformed into a camp, properly laid out and arranged, and full of life and activity. Our position was damp and dark, it is true, but we made the best of it, and throughout the night, and in the early morning of the following day, when every leaf and branch was dripping with the moisture of the dense mist in which we were enveloped, we kept up the pretence of cheerfulness, which, in our gloomy, cramped position, even the most light-hearted amongst us could not really feel.

The ascent of the surveying party to the Too Rang Peak enabled Captain Tanner to obtain a glorious view of the country; bounded on the east by the great backbone of this mountainous tract, west of the valley of the Irawaddy. He thus describes his trip:—

Colonel Doran provided us with an escort to accompany us to Too Rang Hill Station, where it was necessary to take angles. The road lay through Lal Hoolien's village, which was occupied by us in January. Thence through the deserted site of Upper Holien, a village having an altitude of 4000 feet, which we found that the Kookies had re-occupied, for we here disturbed some men who had evidently taken up their quarters at this place to watch the proceedings of the troops stationed at Lal Shooma's and Lal Ngoora's. We followed their fresh foot-marks all along the path between Upper Holien and my station on Too Rang Hill, towards which they were evidently proceeding, in order to give intelligence of our northern movement to their friends living in that direction. Upper Holien, which was in an unfinished state when we took it on the 31st of December, occupies a strong and highly picturesque position; it commands the only path leading along the Too Rang Range, which is the chief line of communication between the village of Lal Ngoor to the north, and minor chiefs to the south. The place was taken by a small party under Major Mackintyre, of the 2nd Goorkhas, on the 31st December, and was defended by the Kookies after the fashion of the Kookie people, a smart volley being fired on the leading files of the Goorkhas from a well-concealed stockade, after which they immediately ran away by paths which they had previously cut through the jungle for purposes of retreat. They had here an ingeniously contrived trap for us, a tree suspended by means of creepers, which they cut away when we were close up to the stockade. It luckily, however, struck down only one Sepoy, and he was very severely injured. The path from Upper Holien (4000 feet) to Too Rang Station (4875 feet) traverses a long spur of that range through pleasant, shady woods, which strongly remind one of the northern slopes of the Sub-Himalayas. The *dense mists* which night after night envelope the lower ranges and deep

valleys, are not known at this altitude, consequently the climate is drier, and considerable difference in the vegetation is noticeable. Bamboo almost disappears, and the great creepers and orchids which load the forest-trees below are no longer found, or, at any rate, are not nearly so abundant. From the survey station of Too Rang all the great villages of the northern Howlongs are plainly visible to the eastward, and beyond them, extremely remote, a faint cloud-like mountain-range, the peaks of which have an altitude of between 8000 * and 9000 feet. From information collected from friendly Kookies, I have little doubt that the distant range I now speak of is the great backbone of this mountainous tract, and I believe separates the drainage of the feeders of the Irawaddy from that of the Koladyne and its tributaries.

To the northward the view comprises the valleys of the Toot (Gootur) and Klong Doongs (Dillesur), and the lofty broken range which separates those two streams. The Synal Klang range, which is, I believe, the western limit of the tract occupied by either the Syloos or Sook Pilal, may be traced up to the latitude of 23° 50′ running in a direction slightly to the west of Nuth.

The peaks of the Lysral Klang and of the range on the right bank of the Foot Doong, the names of which I have not been able to ascertain, have a gentle slope to the eastward, the opposite face being precipitous. Their appearance reminds me strongly of the lower ranges skirting the Sind Hill districts, for not only in shape and general configuration, but in colour also, they greatly correspond. The southern faces of the slopes and peaks are greatly exposed to the sun, which so far dries up the moisture, that the thin layer of soil which covers them is no longer able to support the forest vegetation of the northern slopes, and is replaced by grass, at this season of the year quite brown and dry.

The view to the north-west from Too Rang Hill is totally different to that of the sea of mountains inhabited by the Howlongs to the east, or of the brown-scarped peaks of Sook Pilal's ranges to the north. Small and insignificant hills, alternating with plains of forest-jungle, stretch away until they are lost in the brown haze which overhangs the Cachar country. It is this region which appears on the maps as a blank, and which is marked "unexplored." I must confess that I believe the accurate survey of such a tract would be no easy task; there are few prominent landmarks, and, I understand, few or no inhabitants, and consequently no roads; the want of the latter being one of the greatest difficulties a surveyor has to contend against when mapping an unexplored forest-clad country.

Captain Tanner afterwards visited a beautiful cascade in the valley of the Kawa Doong River, which he thus describes:—

The waterfall is situated on the Kahoo Doong (or Kawa Doong) stream about 1200 feet below Lall Shooma's village, from which it is reached by an easy bridle-path. Above the fall the Kahoo Doong is a most beautiful stream, flowing placidly between high banks close to the water's edge, with the luxuriant vegetation peculiar to these parts. From the quiet stream above, the water is suddenly launched over a scarp of some 50 feet into a clear pool on a broad ledge of rock, which has been gradually worn away by the action of water to receive it. From this pool the stream then plunges over a second ledge and falls as a sheet of spray and foam into the bottom of an immense amphitheatre of cliffs surmounted on all sides by high forest-covered mountains. The edge of the scarp, the great fissures which rend it from top to bottom, the clefts between the strata, and indeed every available nook and cranny, being fringed with festoons of creepers, ferns and orchids of

* 8115 feet, from a mean of observations.

every variety. The height of this second fall is 350 feet sheer drop without break, the view from the sharp edge of the precipice, looking down into the great black rock-strewn basin below, being one of the most striking that can be imagined; and during the wet season, when there is a large flow of water, must be one of the finest waterfalls in India. From the upper to the lower fall the road is preciptous and highly dangerous to any one not accustomed to hill-climbing; the difficulties of the descent being greatly increased by the tangled mass of fallen bamboos and creepers through which it is necessary to force one's way. Standing on the edge of the deep basin, which in the long course of ages has gradually been scooped out below the great cascade, and looking upwards at the descending water, an impression is created that the fall is many hundred feet higher than really is the case. The rock composing the great wall of cliffs is of very dark colour, the sombre hue being deepened by the shadow of the surrounding lofty hills, which shut out all sunlight. High up in the face of this imposing scarp, which in many places is almost reft and riven from top to bottom, huge forest-trees have here and there found clefts in which to grow and thrive, receiving their moisture from numerous little miniature cascades and from the sheets of spray from the principal fall; though they are completely dwarfed against the height of the broken dark-coloured background, yet they greatly enhance the beauty of the scene and add much to the general effect. Perhaps the most picturesque view of the fall is obtained some distance down the stream, which is of the clearest sparkling water rushing between ponderous massy boulders which have fallen from the crags above. Here the trees grow to great height, are of every variety of shade and form, and, when lit up by a little sunshine, stand out in strong relief from the dark background; the snow-white cascade in the centre, unbroken in its entire fall of 350 feet, still remaining the chief and most beautiful feature of the picture.

The Sujjuk River is navigable for boats to a place called Vanoona's Ghaut, at which point the column encountered the first resistance from the Syloo and Howlong tribes; and on ascending the ridge beyond the Sujjuk they first realized the difficult nature of the country to be invaded. Captain Tanner thus describes it:—

It was from Vanoona's village that the force first overlooked the territories of the Howlongs and Syloos, and whence we first became aware of the great difficulties which must be overcome before those tribes could be subdued. We were now in the midst of a country of which we knew little or nothing. Of the route by which to march we could obtain only the most unreliable information, and the natural obstacles which we believed we should meet with at every step had been magnified by rumour. Behind us lay the valley of the Sujjuk, a tract generally flat and broken only by insignificant-looking ridges, and yet it had taken several days' hard marching through water and mud, over rocks and abrupt slippery slopes, and through dense interlaced jungle, to reach the spot on which we now were. The country in our rear through which we had hitherto marched was inhabited by a tribe whose sympathies being on our side had been our guides, and yet we had already experienced to a slight degree the difficulties of moving in this forest-clad land. In the great unknown mountain region in our front, high ranges and deep dark valleys, took the place of the insignificant ridges of the Sujjuk, and we were presently to contend with an enemy whose numbers we could not guess, whose fighting qualities were supposed to be rare, and whose mode of warfare we know, from a couple of days' experience, to be of a kind against which we could hardly hope successfully to compete. We had heard of poisoned arrows, of cunningly concealed stake springs, which might transfix

one at any moment when traversing the tortuous forest footpaths; of gigantic noose-traps, which might suddenly hoist one aloft out of reach of friendly aid; of carefully hidden bamboo-spikes set as thick as porcupine's quills around the stockades, and on the only accessible slopes leading up to them; in short, of every kind of trap, snare, and pitfall which an ingenious and cunning savage might be expected to prepare for an enemy unaccustomed to his stratagems and to his country. Such being the case, how could we hope to subdue the people inhabiting the vast expanse of country which from Vanoona's village was spread out before us? As far as the eye could reach to the north, to the east, and to the south-east, on the most remote ridges and on the loftiest peaks, we could discern the numerous and well-populated villages of our enemy who were to attack us by night and by day from the cover of artful stockades, from overhanging and inaccessible cliffs, and from the deep shadows of their trackless impenetrable forests. We were not only to carry on warfare with a people whom we could never expect to meet in open fight, but were led to suppose that even the elements also were to be opposed to us. We might expect deluges of rain before the operations were half over, cutting us off from our supports and from supplies, and exposing us to every inconvenience and hardship that might ensue from inclement weather, with but slight and inadequate means of protecting ourselves therefrom.

It was from our encampment at Vanoona's village that we derived our first impressions of the magnificent scenery of the remarkable country of the Lushai. I have described before the panorama from this point, as embracing an extensive view of mountain and of valley, of serrated ridge-like mountain-chains piled one behind the other, and rising higher and higher towards the east, until the view in the far off distance is backed up by a faint blue mountain range of great altitude;* of mountains separated from each other by deep land-locked valleys and by streams walled in between high abrupt ridges, and over mountain and valley from the highest peaks down to the very bottom of the dark ravines a clothing of the most profuse vegetation of every hue and colour. The shades which towards evening overspread the valleys, and which gradually creep up the sides of those hills which are not far distant, and the shadows which fall across the ranges beyond, are of the deepest purple-blue; the evening sun at the same time lighting up the more prominent peaks and spurs with a most exquisite rich golden rose. The lovely tints which pervade the landscape on a bracing December evening, when the air is pure and clear, far surpass in vividness anything I have before seen in any part of the world; in no other country has it been my fortune to see such wonderful effect of aërial perspective. Then, too, the foreground is as striking as the rest of the picture; there are long cultivated half-cleared (?) slopes dotted here and there with gigantic forest-trees, which, from their size, have resisted the axe and the fire of the cultivator when preparing his lands for crops. Artistic groups of graceful trees intermixed with bamboo adorn these slopes, and at your feet lie deep gorges, whose sides are clothed with tropical vegetation of the most luxuriant description. Pleasantly situated in the open cultivated spots may be seen the cheerful, neatly-built bamboo-houses of the cultivators, thus giving a finish as it were to one of the most striking pictures that can be imagined.

Such is the view on a clear December evening, but during the night a transformation, almost magical, comes over the scene, and it is difficult to

* I have succeeded in measuring one remarkable peak of this chain, which has an altitude of 8115 feet. I believe that some points of the same range to the southward are little short of 10,000 feet, but I could not get sufficiently long bases to fix either their positions or height with accuracy.

imagine that the change, which is revealed by the early morning light, can be wrought in only a few hours. At sunrise you no longer behold the valleys and the spurs of the opposite ranges which on the previous evening so charmed you with the wonderful colours in which they were bathed. There now lies around you a sea of mist, which ocean-like covers the whole face of the country to the westward as far as the eye can reach. This ocean of condensed vapour is perfectly level, and, broken only by rippling wave-like furrows, except where the higher peaks shoot up through it with clear well-defined shores, resembling islands rising up out of a frozen sea. The valleys to the eastward are also full of this dense heavy mist, which pours over the lower gorges and gaps in the opposite ranges like mighty silent Niagaras. The valley of the Kowa Doong stream to the east of Vanoona's village is narrow and backed up by a high-peaked range of hills; it is full of mist, and looks like a great river stretching away to the southward for miles, and receiving at its upper end several of these great cascades of vapour which are so remarkable. These mists lie on the face of the country until ten or eleven o'clock, when they are dispersed by the mid-day heat. It is only at early morning that the wonderful appearance of the heavy stratum of fleecy vapour is seen to perfection, for at that time the sun's rays break through the light clouds and between the high peaks of the eastern horizon, and here and there light up the mist-waves and the upper curves of the cascade of cloud with a most dazzling silvery whiteness, dotting the landscape with patches of light, which are almost luminous.

Captain Tanner, in the end of February, undertook a journey down the Uiphum Range towards the "Blue Mountain" of the old maps, to the south.

24th to 27th.—In travelling down the Uiphum range from Demagiri, we found it impossible to make more than 4 miles a day, our time being greatly occupied in cutting our way through the bamboo-jungle, and searching for water in likely-looking ravines. It is needless to describe the different days' march, one being so much like another. The whole of the Uiphum, as far as I have traversed it, bears signs of having been inhabited and cultivated during the present generation. There is little primeval forest, the whole surface of the practicable slopes and ridges being covered with closely-growing bamboo-jungle. It is through such vegetation that when a path has been for many years disused it is so difficult to march with coolies. Wild elephants and rhinoceros appear to abound in great numbers in this tract, and between them they had managed to keep portions of the old deeply-worn Kookie path open, and in such places we found no difficulty, but, where the path happened to take a sudden turn either up or down a half-hidden connecting saddle, we invariably lost the track, and only found it again after struggling and floundering about for hours amidst fallen trees, dead bamboos, and interlaced creepers, which had to be cut away almost at every step. Our encamping-ground was invariably on the most open available spot on the range, generally with a precipitous slope towards the west, and a more gentle one on the opposite face. I had with me about seventy men, inclusive of coolies; and to clear sufficient space to accommodate this number was a work of some little time; the bamboo once cleared away, however, the situation was pleasant, commanding a fine view of the valleys on either side of the range.

28th.—Having only two days' provisions left, I was obliged to leave the coolies under a small guard, and proceed with the remainder of the Goorkhas and line-cutters down the range in search of a high, commanding peak, which I had observed from one of my tri-junction stations to the northward. I calculated that I must be within a few miles of the point, and I therefore hoped

to reach it, observe therefrom, and return in one day. At ten o'clock a Goorkha reported from the top of a high tree that the peak was still several miles off; we, therefore, made every exertion to push on more rapidly: the old disused path, luckily, became a shade more open, and by a quarter to twelve we found ourselves at the base of the peak I had been so long making for. Here an unexpected difficulty arose: the hill was so steep and craggy that, for some time, I despaired of being able to reach the summit. The ever-ready little Goorkhas, however, at once came to my aid, and in a short time, by utilizing creepers, roots, and bamboos, enabled the theodolite-carriers to scale the broken scarp. This, however, was not effected without some difficulty, and, perhaps, a little danger; for city-dwelling Punjab calasses, though trustworthy and hardworking, are, nevertheless, quite unaccustomed to crag-climbing. It was now midday, and I had a good walk for four or five hours before me, and besides had to clear the peak and observe before returning; it was, therefore, by the greatest good luck that I found not more than a dozen trees growing on the summit of the peak, which was far higher than any in the neighbourhood, and for survey purposes the very best that could have been selected. The bamboos and the trees were soon cleared away, and by 2 P.M. I had taken my angles and was ready to commence the return march to my camp, which we reached at sunset—all of us quite tired and exhausted. It was from this station, which, in the Kookie language, is called "Thang Sang," the "Commanding Hill," that I made the final observations to Kansa Tong, the "Blue Mountain" of the maps, which is the most north-westerly point of the Akyab District. The view was most extensive, and quite uninterrupted all around. At my feet, to the eastward, flowed the Tooi Chong, which drains the western slopes of Kansa Tong,* and the eastern ravines of the Uiphum † ranges. The former pretentiously-named hill, which catches every one's eye on the map of the hill-districts, is about 4000 feet lower than the great ranges which lie beyond the Kolodyne,‡ and which back up the view from Klan Sang in that direction. Looking either north or south, the remarkable parallelism of the ranges in the neighbourhood is very apparent. The Uiphum, Kansa Tong, and Saichal ranges, stretch away for miles to the southward, with broad broken valleys between them. The peaks of the Uiphum, of which Klang Sang is the highest (2600 feet), run in a wonderfully straight line, one plane-table ray cutting all the most prominent points to the southward for very many miles, in which direction the range appeared to die away in altitude. The panorama disclosed from this point is hardly as interesting as any of those I had before seen from other ranges; the hills are so uniform in character and general appearance as to be monotonous, and besides, in point of height, they are in no way remarkable. The whole of the region to the east and south-east is apparently uninhabited, and must have been so for many years. The ranges bordering the Kolodyne and lying between the Kansa Tong and the great mountains to the east of that river, bear no traces of old village sites. It is possible, however, that there may be a few Shendoo villages in the far east which were hidden from me, for I am informed by Ruttun Pooya's Kookies that the Shendoos or Poois (or the Lakirs as they term them) never live on the summits of the hills as the Howlongs and Syloos do, but avoid very exposed situations. At the same time I should doubt there being any inhabitants in the neighbourhood of the Blue Mountain, and think it almost certain that there are none on this side of the Kolodyne.

* "Tong" signifies in the Mugh language hill or range. In Kookie "Klang" or Ilang has the same meaning.

† Uiphum, "Dog's grave" in Kookie.

‡ "Kolodyne" is a Burmese word. I cannot ascertain the Kookie names of the chief branch of this river in the country to the north of the Blue Mountains. The "Tooi Tsang" appears to be one of its largest tributaries.

Since submitting this diary, I have examined the old published and unpublished maps in the Surveyor-General's Office, to ascertain the reason of applying to such an unimportant range as the "Kansa Tong" so high-sounding and inappropriate a name as the "Blue Mountain," which is shown in the latest map of the Chittagong Hill Tracts.

Lieutenant Cheape, Bengal Engineers, who, many years ago, was one of the first to turn his attention to those hills, has distinctly marked the "Blue Mountain" as one of the peaks of the lofty range which stretches nearly from the 23rd parallel of latitude down to Cape Clear in Burmah. He had, however, no means of laying down the mountains in the far east in their true position. Some points of the great range on the left bank of the Kolodyne just alluded to have from time to time been approximately determined; but, until now, the highest of the chain, the "Mul Seelaimon," 7100 feet in altitude, has never been accurately fixed or measured. The "Blue Mountain," a fit name for this high and conspicuous peak, should have been pushed back to the eastward, with the rest of the topography, when the old map of Captain Pemberton was corrected, but this was not done; the *name* still occupies the position it had on the old map, whilst, in moving back the detail, the Kansa Tong, only 3600 feet in altitude, accidentally falls where the Blue Mountain was formerly marked, and consequently it is dignified with a title to which it can lay no claim whatever, and which was certainly intended for the high bold mountain behind it.

From the ranges to the westward, skirting the cultivated country in the neighbourhood of Chittagong, whence I first saw and noted the Mul Seelaimon, the Kansa Tong, if visible to me at all, could only have appeared insignificant when compared with the imposing mass of the Blue Mountain, rising to nearly double its height behind it. It must have been so with Lieutenant Cheape, who would never have marked in his map a broken hill of low altitude like the Kansa Tong, when, from the whole country round the Mul Seelaimon, the highest mountain in that part of the country, the chief and boldest feature in the eastern horizon must have forced itself prominently upon his attention.

Captain Tanner's final expedition was southward to the Jow Pooi Mountains.

15*th March*.—I started with 20 good men of the 4th Goorkhas, sufficient Coolies, two Howlong guides, and an intelligent interpreter. The road, as usual, followed a ridge, and for a mile or two was fairly passable, but after that we had to commence cutting our way, reaching at sunset an old village site, where, after a long search, we found water. We were now at an elevation of 4500 feet, and to reach my point at Jow Pooi, had still to ascend and travel a considerable distance; we therefore made an early start, and, after leaving the dense high grass of the old village site, we entered a wood with but little undergrowth. We soon lost all traces of cane; the creepers of the lower ranges became more and more rare, and bamboo almost disappeared, till at 5000 feet we found ourselves travelling over a slightly ascending path through a pleasant forest of oak. The oaks of these hills, of which there are two species, are not similar to those of the Himalayas, and are even less like the English tree, and were it not for the numbers of acorns strewing the ground, it would be impossible for any one but a botanist to recognise them as belonging to the genus *Quercus*. At 5100 feet, the trees no longer grew luxuriantly, and I knew that I must be near my point, which I had found previously by computation to be over 5200 feet. The summit was soon reached, and as I have always found, from the situation being so much exposed, the trees were stunted; we therefore soon had them cleared away sufficiently to allow me to *commence my work*. From this point, which is the highest (5200 feet) *reached by any portion* of General Brownlow's column, the view was exceed-

ingly fine, embracing the whole of the Howlong and Syloo country, the cliffs of the Mooi Fang Klang being just discernible to the northward. To the westward, beyond a confused mass of unimportant hills, I could distinguish parallel ranges of the Kansa Tang, Uiphum, and Saichal Klangs, with others in the neighbourhood of the sea, faintly visible beyond them. To the eastward, more than 4000 feet below me, the tortuous course of the Kolodyne and its larger tributaries could here and there be detected winding round the hills inhabited by the Southern Howlongs, and beyond them, and distant from me but a few miles the imposing mountains of the Pooïs or Shendoos, averaging between 6000 and 8000 feet above the sea. In the region occupied by the latter tribes, of whom we have only the most unreliable hearsay evidence, the ranges no longer run in monotonous serrated ridges, but rise gradually and imposingly peak upon peak, in long striking picturesque curves and contours, from the very banks of the Kolodyne, the background to the far east being filled up by the Sang Ow Klang, and further to the south by the Mul Seelaimon—the great "Blue Mountain" of the old maps—situated near the north-easterly corner of Akyab. There was only one Shendoo village in sight, which was situated on a peak of the Purun Klang, one of my points 6083 feet above the sea. Other Shendoo villages were reported to be within a day's march; the Howlong guides therefore remained on the *qui vive* during my stay on the hill-top, for between these two tribes the most deadly animosity exists, and for a Howlong to be caught by a Shendoo is certain death or at least captivity for life.

Of the close proximity of the Shendoos there could be but little doubt, for, on yesterday's march, I had passed a strong carefully-concealed block-house, situated in a strong position on the summit of a narrow ridge, thickly set around with sharpened bamboo-stakes. This house commanded the only road leading southward from Saipooga's country towards that of the Shendoos. I was told that the cultivators under Bundoola, the greatest of the Southern Howlong chieftains, are obliged to stockade themselves in their fields in similar block-houses to protect themselves against their powerful and aggressive neighbours, the Shendoos, who occupy the slopes of the hill which arises immediately in front of Bundoola's village, and which, from several points I had noticed, was strongly fortified. I regretted having to leave this magnificent point of view without endeavouring to make a rough sketch of the panorama of Shendoo land, which, without exception, was the most remarkable I had seen in the Lushai country. I had not even time to clear the peak properly, and the jungle still remains standing to the south and south-west. Time was precious, and we had to reach the General's camp before night, so as to march with him on the following morning. This we succeeded in doing, but not without having performed an excessively hard day's work.

With regard to the inhabitants of these hills, Major Macdonald estimates the Syloos at 4000, and the Howlongs at 12,000 people. The villages are always built in or near the summit of a peak or ridge, to obtain immunity from fogs, miasma, and the plague of insects and leeches. Each hut is isolated, consisting of two rooms, with a verandah at the back, and a platform in front; the whole on raised piles. The huts are well built of thick matting made of split bamboos, and thatched with palm-leaves. The Kookees raise crops of rice, cotton, melons, gourds, beans, maize, chillies, and sweet potatoes, by what is called joom cultivation. They are far more civilized than the Bheels, Gonds, or Sonthals, and show signs

of Chinese descent. Major Macdonald thus concludes his account of them:—"I believe no happier people exist in the world. If savage, they are free from the craft of usurers, as well as from the persecution of the police and the love of the law's protection."

The party with the north column left Cachar on the 25th of December. The area triangulated by Captain Badgley lies in the east and south-east part of Cachar, along the Munipur and Cachar boundary, and advances 25 miles in the Lushai country. Five parallel ranges, running from south to north, intersect this country, and, gradually lessening in height, are lost in the plains of Cachar. Between them lie four valleys, broken by innumerable small ridges and swamps, and in three cases drained by considerable streams more or less navigable for boats. The most western range is the Chattarchur, 3200 feet at its highest point, along which the Lushais made their raids on the western tea-plantations. The next range is the Bairabi, only attaining a height of 1800 feet; and between the Chattarchur and Bairabi flows the navigable river Dallesar. The easternmost of the Cachar ranges is the Buban, the highest point of which is 3100 feet; and below it flows the Barah, a fine stream draining all eastern Munipur and the north-east of the Lushai country as far as the Burmese frontier. Tipai Mukh, on the Barak, was the depôt of the column, whence it marched south into the Lushai country, up hill and down valleys, each rise being from 2000 to 3000 feet; a country of steep ridges and narrow vales. Oak is the principal timber, with fir and rhododendron on the highest hills, and many great trees, which Captain Badgley did not recognise; among them, one called *bougpui*. The scenery is very fine, the country healthy, and the climate delightful.

The Looshais are fairer than the Bengalees; about 5 feet 6 inches in height, well made, active, and intelligent. Their figures are splendid, full and muscular, with well formed heads, good foreheads, oblique eyes, and high cheek-bones; depressed noses, large but not thick lips, and scanty beards. A large square cloth or two is their only clothing. Their only ornaments are a tiger's tooth round the neck, and a small tuft of scarlet feathers hung by a string to the ear. They have no temples or images, but their tombs are ornamented with trophies of skulls of animals and feathers.

Their mode of war is by surprises and bush-fighting; and they called out to the Sepoys not to stick like cowards in the open, but to come against them in the jungle like men. They make raids *among themselves*, as well as on Munipur, for arms, women, and *heads. They* travel with remarkable celerity, carrying nothing

but arms and enough rice for the journey; a fresh joint of bamboo at each new camping-ground serving every purpose of water-jug or cooking-pot. Their villages are guarded by loopholed pallisades. The products of the country are india-rubber, wax, and ivory. Captain Badgley's party returned to Cachar by the middle of March.

The Government of India have acknowledged the value of the services of both these surveying parties, whose operations were conducted throughout in connection with previous triangulations; and a new general map of the entire eastern frontier is now in course of preparation, showing all these recent additions.

Dr. BRANDIS said he had never been in the hills of Eastern Bengal, but there were many points of similarity between the vegetation and cultivation of that district and the vegetation and husbandry of the wild tribes of Burma. The Toungya or Toom mode of cultivation was a very rude, but, in some respects, a very efficient one. It consisted in cutting down the forest in December or January, and chopping the branches into small pieces, the larger stems and trunks being alone left as too troublesome. In March or April, towards the end of the dry season, the whole was set on fire, and the ground was thus covered with a thick layer of white ashes. With the first rush of the monsoon in May or June the great mass of these ashes was washed down into the valleys by the streams, and then the ground was prepared in an exceedingly simple manner. All that was done was to dibble little holes all along the hill-side with small spades one-and-a-half or two inches broad, and in these to sow the rice or whatever else they wished to grow. To prevent the fires that pass through the forests during the dry season from consuming the portion that was cut down, a fire-path was cleared round it, and this was watched day and night to prevent premature destruction. When the seed was sown it germinated rapidly, and the whole hill-side was covered with vegetation. The only trouble remaining was the weeding, which was done with great care, until the rice ripened in the autumn. This kind of cultivation naturally engendered unstable habits among the people, for the clearing of the forest around a village one year necessitated the removal to another site the next year. The building of one of those villages was, however, a very simple affair. Among the Lushais the custom appeared to be to have a house for each family; but in Burma, among some of the Karen tribes, a whole village would consist of one large building, where each family had but one compartment about 15 feet by 10 feet. Ten to twenty families would thus dwell together. The houses were made of bamboo, which served for flooring, posts, walls, and very often roofs. There was thus no great difficulty in moving a village, and rebuilding it in another place. The result was that these wild tribes were able to provide sufficient rice and vegetables, and very frequently cotton, and silk from mulberry plantations made near the banks of rivers, which they sold, and obtained salt, cloth, and ironware in exchange, by means of the labour of about 100 days in the year. He had lived for eight years a great deal among the hill-tribes of Burma, and upon that experience he had founded his estimate of the time occupied in labour. This, of course, prevented all progress. All that could be hoped of the Lushais was that, now that some of them had been brought under British Government, peaceful feelings might take the place of past hostilities, and that they might progress as favourably as the Karens in Burma, who had made most remarkable progress in civilization, and who for loyalty were distinguished among the numerous nationalities which composed our Indian Empire. This

change was mainly due to the wonderful exertions of the American missionaries, who had practically turned these people from a race of idle drunkards into an exceedingly useful and intelligent nation.

Sir CECIL BEADON said the survey parties which accompanied the late Lushai Expedition had contributed in a very valuable manner towards our knowledge of the geography of Eastern Bengel. Indeed, until eight years ago, the Government of India was absolutely ignorant of the fact that this Lushai country was included in the British dominions. By the treaty of Yandaboo with the Burmese Government, after the first Burmese War, the boundary between Burma and the British dominions was declared to be the Yeoma range of mountains. At one point of that line of boundary lay the little isolated principality of Munipur. The British district of Cachar was bounded on the east by Munipur, while the British district of Chittagong to the south was bounded by the Yeoma range, or Blue Mountains. But there was a considerable intermediate territory between the northernmost portion of Chittagong and the southernmost point of Cachar, and this intermediate territory was supposed to belong to Independent or Hill Tipperah. The chief of Hill Tipperah was a zemindar, who paid revenue to the British Government as an ordinary landowner; but, in addition to his zemindaree, he exercised a sort of independent sovereignty in Hill Tipperah, where his jurisdiction had never been interfered with by the Indian Government, and it was believed that this jurisdiction extended right away to the boundary which divided the British territory from that of Burma and Munipur. When, however, about eight years ago, the operations of the tea-planters in Cachar began to extend to the southward, up the valley of the Dallesur, and provoked the hostility of the Lushais (though there were other causes in operation at the same time), an expedition was sent to chastise the Kookies, who were concerned in a raid upon some of the tea-plantations in the north, and it was then discovered that the chief of Hill Tipperah never claimed to exercise any jurisdiction whatever to the east of the Chuttachoora range. Thereupon it followed that this Lushai country, lying between the eastern boundary of Hill Tipperah and the Burmese frontier, belonged to England. It therefore became a desideratum to acquire a more perfect geographical knowledge of the country which constituted the watershed between the waters of the Dallesur and the Barak on the north, and the waters of the Kurnafoolee and the Koladyne on the south. That want had now been, in a great measure, supplied by the labours of the surveying parties who accompanied the expedition against the Lushais last year. The rivers running northward and those running southward were interlaced in a most curious manner, so that the watershed between the two systems was really a zigzag line, and it was owing to that strange conformation that the two surveying parties, proceeding in opposite directions, although they crossed each other in point of latitude, never actually met, but were separated from each other by between 30 or 40 miles of longitude, simply because one party was compelled to follow one ridge, and the other party another and parallel ridge, being separated from each other by two or more ravines, each ravine permeated by a deep stream. Much remains to be done before our geographical knowledge of the country would be complete; but it was difficult of access, and the scientific officers who accompanied the expedition had made the most of their opportunity.

The PRESIDENT expressed the thanks of the Meeting to the authors of the two papers that had been read. He did not think the Society had before received papers on this part of Asia; but, as it formed a portion of British territory, it was of considerable interest. He could not admit that Russia was very much ahead of England in endeavouring to obtain scientific information with regard to its own territories and the countries adjoining. Although an observatory had been established at Samarkand, the knowledge the Russians possessed of the districts recently conquered was still very crude. Geographical

information was not to be obtained in a day, but must be the result of a sustained series of careful observations. He regarded the Trigonometrical Survey of India as one of the grandest geographical works ever instituted in any country or any age. He therefore did not think the Indian Government could fairly be accused of carelessness in the prosecution of scientific inquiries.

Third Meeting, 9th December, 1872.

F. GALTON, Esq., M.A., F.R.S., VICE-PRESIDENT, in the Chair.

ELECTIONS.—*Lieut.-Colonel Henry Robert Addison* (Portuguese Vice-Consul); *M. George Artingstall, Esq.*, J.P.; *R. Redmond Caton, Esq.*, F.S.A.; *Thomas Beath Christie, Esq.*, M.D.; *Alfred Dent, Esq.*; *Frederick Drew, Esq.*; *A. Fitzgerald, Esq.*; *Henry Forbes, Esq.*; *Charles Hockin, Esq.* (M.A. Cambridge); *J. R. Longden, Esq.* (late Governor of Trinidad); *Alexander Mackintosh, Esq.*; *William Matthews, Esq.*, M.A.; *John McCall, Esq.*; *Morá Diego d'Uhson*; *Francis Parry, Esq.*; *Henry Cooper Rose, Esq.*, M.D.; *S. Arthur Sewell, Esq.*; *Henry Sturt, Esq., Jun.*; *Lieutenant Richard Thompson*, R.E.; *John Anderson Willans, Esq.*

PRESENTATIONS.—*William Augustus Mitchell, Esq.*; *John Remfry, Esq.*

ACCESSIONS TO THE LIBRARY FROM NOVEMBER 25TH TO DECEMBER 9TH, 1872.—'Notes on Natal.' By J. Robinson. 1872. Donor the author. 'Droits du Portugal.' Par le Vicomte de Sa' da Bandeira. Lisbonne, 1856. Donor Visconde Duprat. 'Reports on Enke's Comet, 1871.' By A. Hall and W. M. Harkness. 'Papers on the Transit of Venus, 1874.' Donors the Commissioners of Congress, Washington. 'The Mormons and the Silver Mines.' By James Bonwick. 1872. Donor the author. 'A Journey to the Source of the Oxus.' By Captain John Wood; with 'An Essay on the Geography of the Valley of the Oxus,' By Colonel H. Yule, C.B. 1872. Donor J. Murray, Esq.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF NOVEMBER 25TH.—4 Sheets of the Geological Map of Sweden, accompanied by letterpress. Presented by the Swedish Government. 9 Maps of various parts of Austria, on 44 Sheets. And a Map of Hungary, on 60 Sheets. Presented by the Austrian Government. (By application.) Geological Map of the Island of San Domingo. By W. M. Gabb, Esq., Chief Geologist. Presented by the author.

The CHAIRMAN announced that since the last Meeting the science of Geography had sustained a severe loss, in the person of their Gold Medallist, Mrs. Somerville, who died, at an advanced age, at Naples. She was full of geographical enthusiasm to the last, and strangely enough, almost in the very week of her death, her text-book of physical geography (the last edition, edited by Mr. H.W. Bates) had been accepted in most of the Colleges of India as the text-book for instruction in that science. Another loss came somewhat nearer home to many of the members, that of Sir Donald McLeod, the eminent Indian administrator, who had been a regular attendant at the meetings of the Society. His death was the result of an accident, as no doubt most of the members were aware. Some important geographical events had also taken place. That very night Sir Bartle Frere and Lieutenant Cameron were expected to land at Alexandria; and Lieutenant Grandy had left England, on his way to the West Coast of Africa. About the 15th of the present month he would land at Sierra Leone, the first step in his onward journey to St. Paul de Loanda. The Admiralty, the Colonial Office, and the Portuguese authorities, had all, in the most cordial manner, sent various letters, granting the assistance which had been asked. The last letter written by Lieutenant Grandy, before leaving England, and dated November 30th, was as follows:—

"OFF THE BELL BUOY,
"Saturday, November 30th, 1872.

"SIR,

"I have the honour to report that we left the Mersey at 10·30 this morning. Mr. Young was with us the greater part of yesterday, and I gave him all information as to our future movements: he was much pleased that the Expedition had been so quickly completed.

"I take this opportunity of thanking you for your kindness and assistance in promoting an early departure, and furnishing us with letters of introduction to the authorities at Sierra Leone and Loanda. I beg you will allow me, through you, to convey my best thanks to the members of the Expedition Committee, for the care they bestowed on all matters connected with outfit, &c.; also to the several officers of the Society, from whom at all times I have received the greatest kindness and assistance. Sincerely trusting that our work so auspiciously commenced may under Providence be brought to a speedy and successful termination,

"I have the honour to be, Sir,
"Your most obedient Servant,
"W. J. GRANDY.

"P.S. Letters forwarded by steamer of 12th and 30th December, directed to care of British Vice-Consul at Loanda, will reach me.

"*Sir Henry Rawlinson, K.C.B., &c.,*
"*President of the Royal Geographical Society.*"

He had also the gratification of being able to announce that the astronomical observations made by Dr. Livingstone had safely reached the hands of Sir Thomas McLear, the late Astronomer Royal at the Cape of Good Hope. He it was who had computed all Livingstone's previous observations. His son, Commander Thomas McLear, the second in command of H.M.S. *Challenger*, had received a letter from his father, dated September 19th, in which it was said that the determination of the observations would require at least three or four months, so that a rich harvest might be expected. Two important Australian expeditions were about to start from stations on the line which the telegraph followed, to the West Coast of Australia. One was supported by the Australian Government, the other by a private gentleman. They would start

from points some hundreds of miles apart, and converge towards the west coast; consequently, between them a large portion of Western Australia would be explored. The last point of interest he wished to mention was the departure of H.M.S. *Challenger*, a large steam corvette, that had been equipped and despatched by the Government mainly at the instance of the Royal Society. The object of the voyage was chiefly natural history, but it also included the determination of currents, and what might be termed sub-oceanic geography. She left Sheerness on Saturday last.

ADMIRAL G. H. RICHARDS said the *Challenger* had been fitted out for the express purpose of making a voyage of discovery and scientific research. She would leave England in a day or two, for a voyage round the world, one of the principal objects being to investigate those hidden and mysterious regions lying beneath the surface of the ocean. In this respect it differed from any expedition hitherto undertaken either by our own or foreign governments. She would probably remain twelve months in the Atlantic; then, passing the Cape of Good Hope, would make her way to the edge of the great ice-barrier fronting the Antarctic continent, and endeavour to extract some of the secrets which lie hidden there. She would afterwards visit Australia, New Zealand, the Coral Sea, Manilla, Japan, cross the Northern Pacific to the North-West Coast of America, and then finally traverse the Pacific from north to south, so that she would explore the whole of the great oceans throughout their length and breadth. It was perhaps a little remarkable that it was exactly 100 years (1772) since Captain Cook set forth on his voyage. The *Challenger* was accompanied by a staff of officers who were not only naval surveyors, but scientific naturalists such as never before left on any expedition of this kind. Great results might therefore be expected, and he hoped that, in three years or a little more, the expedition would return and fully justify the expectations that had been formed. The equipment of the *Challenger* reflected great credit on the authorities, and was worthy of the enlightened times in which we were supposed to live.

Mr. FINDLAY, referring to the two proposed Australian Expeditions and to the congratulations which had lately passed in reference to the successful opening of the line of telegraph through Australia from south to north, protested against the manner in which the name of John McDougal Stuart had been ignored by the newspapers and writers on this subject. His name should have been the first transmitted by the line.

The CHAIRMAN said geographers, at all events, had not forgotten that, single-handed, with only a few pack-horses, John McDougal Stuart crossed the continent along the line which the telegraph now takes.

The following Papers were then read :—

1. *On a Projected Railway Route across the Andes, from the Argentine Republic.* By R. CRAWFORD, ESQ., C.E.

IN compliance with a request that I should endeavour, while engaged upon the surveys for the proposed "Transandine Railway" from Buenos Ayres to Chili by the "Planchon" Pass, to collect all such information as could be of interest to the Royal Geographical Society, I beg now to forward the results of our explorations and observations.

I had intended putting them into a paper specially designed for the Society, but I found considerable difficulty in preparing

one that would be at all satisfactory, without borrowing largely from the contents of my Report to the Government of Buenos Ayres. I therefore considered it more desirable to forward a copy of that Report, and to supplement it with some information on points of interest, partially or wholly omitted in my official report as not necessarily appertaining to it. It will, however, be found to contain a considerable amount of data that cannot fail to be of interest in a geographical point of view, as the country travelled over is, to a great extent, almost entirely unknown, even in this republic, and what was known of it previously, even to the Government, which should be the best informed authority on the subject, was of the most shadowy and incorrect nature.

I have had a map of a portion of Chili and the Argentine territory carefully compiled to a scale of $\frac{1}{600000}$, and the results of our surveys and explorations marked upon it. Upon examination it will be found that some important geographical knowledge has been added to previously existing maps.

For instance, the "Rio Grande," which takes its rise in the Andes, and, after receiving the contributions of various tributary rivers, flows through the Pampas and falls into the Atlantic in about lat. 39° 55′ s., under the name of the "Rio Colorado," was found to be altogether different in direction and extent to what had hitherto been supposed.

This river has its origin from two separate sources. The less important one is that of the Rio de los Ciegos, a very small stream which takes its rise within 100 yards of the watershed of the Atlantic and Pacific Oceans at the Planchon Pass. After a short and unimportant course, this rivulet takes the name of the "Azufre," which in its turn is changed to that of "Valenzuela," and this latter again loses itself at its confluence with the "Tordillo" (about 20 miles from the watershed), the united waters of the two rivers taking the name of "Rio Grande." The other, and more important source, is the Rio Tordillo, which, springing from near lat. 35° s. and long. 70° w., receiving in its course the waters of the Rio del Cobre, Rio de Santa Helena, Rio de las Vacas, and Rio de las Cuevas, and of some minor streams, terminates, as already explained, at its junction with the Rio Valenzuela, or what then becomes the "Rio Grande."

From this point to where the Rio Grande left the mountains and entered upon the Pampas was supposed to be approximately 81 miles, occurring (according to the map of Senor Rossetti, Professor in the University of Buenos Ayres, which was published in 1870) in about lat. 36° 3′ s. and long. 69° 25′ w., whereas it has now been

explored for a distance of 142 miles down its course, and even then there was no sign of its leaving the mountains and entering on the Pampas, as it was reported to do at the much shorter distance of 81 miles. It was traced down as far as lat. 36° 42′ and long. 69° 43′, when the exploration of the valley had to be discontinued in consequence of the absence of all vegetation and the impossibility of procuring food for the mules (the ground being covered with volcanic scoriæ and cinders). Some new rivers flowing into the Grande (not shown on other maps) were met with and marked down in their correct positions. The most important of these being the "Rio Chico," which is almost as large as the "Grande" itself, at their point of junction. With regard to the mountains and hill-shading shown upon the map accompanying this letter, I have preferred merely to leave the results of our surveys and explorations given; as information, the correctness of which we were not certain of, would be of but little value to the Geographical Society.

Before I left England, in March, 1871, the Secretary of the Society requested that particular attention should be paid to the form and character of the eastern side of the range of the Andes. I consequently availed myself of every opportunity for making notes and sketches of these mountains; and I now forward you six outline drawings in pencil of them, which, although very rough, will serve to convey a correct idea of the character of the Andes from Mendoza to the Planchon Pass.

As to their geological structure they are principally of igneous origin; numerous extinct volcanoes are to be found among them, but the only active one we saw was the "Planchon," which geographers call "Petroa:" basalt, lava, pumice-stone, volcanic ashes, scoriæ, and cinders, abound on every side; but stratified rocks are also to be found, limestone and sandstone occurring in various places. Granite, as far as we saw, was not of frequent occurrence. Many of the mountains consist of a soft rock, in character somewhat like chalky clay, which, from exposure to the air, is very much worn, the softer parts falling away, and the harder alone retaining their positions, assuming in many cases fantastic shapes like the Gothic turrets of some old time-worn castle or church.

The variety of colouring in the soils which compose the mountain slopes is sometimes most striking and beautiful—blue, red, yellow, and white, meeting in strong contrast, not shaded into each other, producing a wonderful effect. This is, in a great measure, due to the almost total absence of vegetation, which is scarcely anywhere to be found among the Andes, except in the

valleys and near water. Along the eastern slopes not a tree is anywhere to be seen, except an occasional one in the most sheltered and protected spots; but a coarse kind of brushwood is common in many places.

To turn now to the "Pampas." They have been so often described in books of travel, that but little is left to be said of them. They are vast plains, marked by but slight undulations, near the sea coast; but becoming more uneven and broken in their surface as the mountains are approached. For the east half of the continent they are generally rich and fertile, covered with high grass, but totally, or almost, devoid of trees (the few stunted specimens which are met with at rare intervals scarcely deserving notice).

Some peculiarly-shaped sand-hills occur in different places. They are called "Medanos" by the natives, and are generally hollowed out in the centre to an equal or greater depth than the surrounding land. They frequently encircle small lakes. In one of them, where there was no trace of there ever having been a settlement, we found potatoes growing wild. They were very small. We had some of them cooked for eating, but they were scarcely old or ripe enough, and from this same cause those which we tried to keep as specimens decayed.

Nearly all the lakes we passed on the Pampas were salt, and the same peculiarity attaches, to a great extent, to the rivers in the same locality. This is especially the case during dry seasons; but after heavy rains, when the rivers are flooded, they can sometimes be used for drinking-water, being at such times less impregnated with salts.

The only rivers met with until more than half the continent was crossed, were the Salado and the "Rio Quinto." I think, however, that it is extremely doubtful whether they do not, in reality, form but one river. The Rio Quinto loses itself in a large marsh called the "Amarga," or rather it becomes absorbed in the loose sandy soil which forms the Amarga; and not far from the same place the river "Salado" takes its rise. It is therefore, I think, highly probable that the water passes through the porous soil from the one river to the other.

The Rio Quinto, following the reverse to the ordinary run of rivers, becomes more important as you proceed up it. When we travelled along it the season was very dry, and there was little water in its sandy bed; during floods, however, it must be a large river. At Mercedes it has cut a channel 1270 yards wide and about 20 feet deep, and within this again another, still deeper,

890 yards across, and from 6 to 7 feet deep, below the bottom of the other channel. The sand in the bed of the river is mixed with innumerable small scales of bright yellow mica, which give it a rich and dazzling appearance.

Until the Rio Quinto is reached, and along its course, the soil is fertile; but between the provinces of San Luis and Mendoza there is an extensive desert, covered with but little else than fine whitish sand. Towards the mountains the soil becomes mixed with gravel; and, with the exception of where it receives irrigation, by natural or artificial means, it is not fertile.

The average height of the plains, at about 100 miles west of Buenos Ayres, is from 150 to 160 feet above the sea-level, and it rises to about 2800 at the foot of the Andes. The highest point of the Planchon Pass, at the summit of the range, is 8225 feet above the sea.

It may be well to guard against a possible misconception arising with regard to the frontiers of the Argentine Republic, as shown on the accompanying map. There is a line of forts marked and the name of each given, but these are generally a few mud-huts collected together, and a small ditch dug around them to prevent the Indians, who seldom dismount from their horses, coming into them. Many of these forts have only from 6 to 8 or 10 soldiers in them, others 20 to 30, and a few 200 to 300; whereas, at the Villa Mercedes, the only place of importance along the whole line, there are generally upwards of 300 troops stationed, it being the head-quarters of the general commanding-in-chief on the frontiers. There are, for the most part, no settlers anywhere near the frontier, and the Indians pass in and out at pleasure.

The frequency of these invasions, especially of late, has been such as to draw down the almost universal condemnation of the press on the administration of the War Department, and it is not unlikely that energetic measures may be adopted by the Government for the better protection of the frontiers.

The principal animals met with were small deer (*Cervus campestris*), which were very numerous on the plains, as were also ostriches (*Rhea*), vizcachas, foxes, Patagonian hares, large lizards (4 feet long), and two or three species of armadillo. Among the mountains guanachos abound, and an animal about the size of a small cat, like the chinchilla in colour and appearance, was seen; it was called by the natives the rock vizcacha. Some wild cats were also met with on the plains, and pumas both on the Pampas and among the mountains; but none of the party saw a jaguar *during the entire journey*.

Condors were very numerous among the Andes, and some eagles were seen. On the Pampas, three different kinds of partridge were met with, as were also blue eagles, black bald-headed and other vultures, a great variety of hawks, and three or four kinds of owls. Numbers of wild ducks frequent the lagunas, as do also white herons, storks, rose-coloured flamingoes, and spoonbills, besides different kinds of ibis, and small white egrets with most delicate plumes.

Where trees were found, wild pigeons were exceedingly numerous, as were also doves and small green parrots.

No wild cattle were anywhere to be seen, and only on two or three occasions were wild horses met with, and then in very small numbers.

I have endeavoured to touch upon all the points of interest in connexion with the expedition, and I hope that the foregoing, taken along with my Report, may furnish some information not previously known.

EXTRACTS FROM REPORT.

"We left Mendoza upon the 17th February, and, marching by way of San Carlos, eventually succeeded in joining the Chilian party in the valley of las Leñas Amarillas on February 29th.

"Upon learning the results of their work up to that time, it appeared that a practicable line had been found over the Planchon summit, although its height above the level of the sea proved to be 8225 feet.

"During the progress of the surveys of the preceding season, although the line did not reach the summit, it became perfectly evident that the rate of inclination of the western slope of the Andes, and the height of the Planchon Pass above the sea, were both very much greater than what had previously been supposed. The next step to be taken was to see if any tributary valley to the Teno offered greater facilities for ascending the mountains. Upon examination, the only one which afforded any prospect of success in this direction was that of the Rio Claro; but, although very favourable for a considerable portion of its length, towards its source the rise is so rapid that all idea of this route had to be given up.

"There remained no help for it but to abandon a considerable portion of the line which had been traced up the bottom of the Teno Valley, near the river's edge, and to endeavour, by rising gradually along the higher sloping ground on the hill-sides, and by a zigzag course in the narrow gorges, to attain to the required elevation, which was successfully accomplished.

"From the summit downwards, on the east side of the mountains, for a considerable distance, no difficulty of importance presents itself; the line naturally following the course traced out for it by the rivers Ciegos and Azufre. It is not until after it enters the narrow and tortuous valley of the Valenzuela that important obstacles are met with. These arise principally from the very sidelong nature of the ground and the rapid fall of the river, which is in reality a mountain torrent; towards its lower end this valley becomes less difficult for railway construction.

"Up to this point there is no choice or selection as to the route to follow, there being but one practicable line; but here the opening in the mountains, *through which the River* Tordillo flows, seemed to offer a prospect of obtaining

a tolerable direct line to San Rafael; consequently the party, as already stated, surveyed up the Rio Tordillo, through the Valley Hermoso, and over the lowest part of the watershed which separates the streams flowing respectively into the Tordillo and Salado, in all a distance of 45 kilometres from the junction of these rivers, from which point downwards their united waters take the name of the Rio Grande.

"Unfortunately the height of this summit proved to be considerably more than that of the Planchon Pass itself, and the distance across it so great as to render the route practically impossible for a railway.

"We therefore moved towards the valley of the Rio Grande on the 3rd of March, a military escort of twenty men having joined us the previous evening.

"Upon reaching the Rio Grande, two surveying parties were formed to work independently of each other, so as to expedite the progress of the survey. I accompanied the lower one, and penetrated as far down the valley as it was possible for me to go, bearing in mind that I had to return and pass over the Planchon into Chili, and that the middle of March was considered to be the latest date to which this could be deferred. Subsequently these explorations were extended much further, and the Rio Grande examined for a distance of 135 English miles down its course; and even then there was no sign of the Rio de las Barrancas, or of a termination of the mountains and the river entering on the Pampas (which is shown on maps as occurring at a distance of only 81 English miles from the junction of the Tordillo and Valenzuela). The valley of this river, which at first presents a fine open appearance, is frequently narrowed, and in many cases almost closed in by high mountains approaching the water's edge. There are some open spaces along it at intervals, but it is by no means an easy valley through which to trace a line of railway, and towards its lower end it becomes almost inaccessible; the river cutting its way through rugged igneous rocks with perpendicular cliffs on either side, and nothing but scoriæ and the debris of extinct volcanos covering the ground, and obliterating all traces of vegetation.

"Throughout the entire 135 English miles there is but one place where a railway can leave the Rio Grande, and that is at one of the open spaces before referred to, known as the 'Llano Blanco.' At the head of this the Chinqueco, flowing into the Grande, has cut its way through the more abrupt mountains which shut in the latter on both sides.

"This place, which occurs at kilometre 130 on the survey line, was selected as the point at which to diverge from the Rio Grande; but, as there seemed to be two directions, either of which might be taken, both had to be surveyed in order to determine which was the better.

"One was up a stream called the Vatra, and the other by the Chinqueco. The former gave very good gradients as far as the summit called Vatraco, on the east side of which, however, the descent was so abrupt as to render it impracticable. The line by the Chinqueco had therefore to be adopted.

"On approaching the source of the last-mentioned stream the railway pierces, by means of a tunnel 1600 yards long, through the summit known as the Llano Blanco Pass, entering on the other side into the valley of the Arroyo Pota-mayim, and thence, descending by the Manzano and Malargue, crosses from the latter to the Rio Atuel at a short distance below this river's junction with the Rio Salado.

"From this point the line follows approximately the course of the Atuel till nearly reaching San Rafael, which it approaches through the valley of the Pintada, crossing the Rio Diamante just below the town.

"Another and a shorter line into San Rafael was examined and surveyed, but the gradients and works upon it were so heavy as to cause it to be abandoned in favour of the one which was adopted.

"Previously to this I had, as already intimated, left the lower party of engineers to continue the surveys to San Rafael, and thence to the point in the Pampas where they had been abandoned; and, on the 15th of March, I joined the staff from the west coast, and accompanied them back to Chili over the Planchon Pass to the Teno Valley, following the line which had been surveyed for the proposed railway and examining it carefully.

"I left Valparaiso on the 14th of April, per steamer for Montevideo, but, upon reaching the latter city, I was unable to proceed to Buenos Ayres till the 11th of June, owing to that port being closed to all persons coming from Uruguay, in consequence of an outbreak of yellow fever at Montevideo.

"Upon the surveying party, which I left on the east slope of the Andes, having reached San Rafael with the line, the Government of Buenos Ayres, considering it unnecessary to proceed further, issued instructions, through the Governor of Mendoza, to discontinue the work, which was accordingly done; the staff returning to Buenos Ayres, where the last of the expedition arrived on the 29th July, 1872.

"The total distance from Buenos Ayres to Valparaiso by the proposed route is 1103¾ English miles, of which there are already constructed 319¾, leaving still to be made 784 miles."

The Paper will be printed in extenso, with Map, in 'Journal,' vol. xliii.

Major RICKARD (late Government Inspector-General of Mines to the Argentine Republic) said he had more than once been over the greater part of the country described in the paper, and it appeared to him that Mr. Crawford's descriptions were very accurate. He did not deny the possibility of making a railroad across the Planchon Pass, but, looking at it from a commercial point of view, he doubted the practical utility of it. It would have to traverse a desert for more than 300 miles from the frontier of Buenos Ayres. He did not think there were as much as 100 acres of land available for agricultural purposes along the projected route, from that frontier to the base of the Andes. The country was in places fit for cattle-runs, but was interspersed with salt lakes and marshes, and totally unsuitable for anything like colonization. The Government, he believed, had some idea of making a road either further to the south or to the north, their object being to connect the Atlantic with the Pacific by a line which would meet the views of commerce, and, to some extent, pay a dividend, if possible, on the outlay. He much preferred the northern route, because it would traverse a more populous district, and the country was less broken, salt-marshes being rare, and the rivers unimportant. The Planchon Pass was much further south than the Uspallata Pass, and probably would be closed for a great portion of the year. The Uspallata Pass would necessitate a great deal of tunnelling, but would probably eventually prove more economical than the Planchon. One of the objects of the Republic in making the railway would be to more effectually secure the frontier, which was at present very unprotected, the Indians being in the habit of carrying off cattle, burning houses, and destroying property, whenever they pleased. Mr. Crawford, in his paper, had stated that there was almost an entire absence of vegetation in the district he traversed, but in the lower ranges of the Andes, further north—in Tucuman for example—there were cedar trees of enormous growth, 8 or 9 feet in diameter. Mr. Crawford did not appear to have met with any 'aguars, but those animals were to be found in nearly all parts of the Republic. He regarded the hairless cattle, which some people believed in, as a myth. The electric telegraph crossed the Pampas from Buenos Ayres to Mendoza, and thence into Chili by the Uspallata Pass, *at a height of 12,500 feet* above the sea. For some distance the line was on

posts, but from Punta de Inca on the eastern side to Ojos del Agua on the western or Chili side, there was a snow-cable, buried 2 feet in the ground along the road, in order to avoid any fault of insulation during the winter months. This plan had proved most effective, and a great convenience to the merchants on both sides.

Sir WILLIAM THOMPSON, in reply to a question from the Chair, said he could see no reason why the snow-cable should not prove a complete success, unless it were broken by avalanches.

Mr. J. W. MIERS, C.E., said, fifty years ago he crossed the Pampas on six different occasions both by the northern and the southern routes. The greater part of the southern route was covered with swamps, and so full of mosquitoes as to render it almost impossible for human beings to live there. It was not very probable, therefore, that colonization would spread very far in that direction. Trees did not grow there, except at the post-houses along the northern route, 10 or 15 miles apart, where peach-trees were planted for firewood. The peach would grow on soil where few other trees could find sustenance. The subsoil of the district was a tufa, so hard that the roots of trees could not penetrate it. Along the line of the present Central Argentine Railway the same post-houses were then in existence for obtaining relays of horses, but cultivation of the soil was almost unknown. The same sterile country existed as far as where the chain from Cordova terminated in the plain, a long distance before reaching San Luis. The country there was more fertile than to the westward of San Luis, where the whole region was a complete desert, without a blade of grass, and with only a few stunted mimosa-trees at great distances apart. This was owing to the soil being over-saturated with nitrate of soda, which, when in excess, destroyed vegetation. At Mendoza, however, in the same desert plain, irrigation was carried on from the River Tunuyan, and vegetation grew luxuriantly; figs, peaches, apples, and other fruits, being abundant. A kind of sanfoin, which in Europe only reached a height of 7 or 8 inches, in this region grew so tall, that a man on horseback would be lost in it. In crossing between Mendoza and Aconcagua the mules found nothing to eat for ten or twelve days, but, at the termination of their journey, the rich pasture there met with quite revived them. The Cordilleras being at certain times of the year covered with snow, the rivers in summer generally had a very large flow, but rarely ever reached the sea. The Tunuyan flowed into a large lake between Mendoza and San Luis, and thenceforward, from swamp to swamp, it seemed gradually to disappear by evaporation. The traveller to Chile passed over two ranges, the first called the Paramilla Range, running parallel to the main chain. From the plain of Uspallata (5900 feet) the road ascends to the summit-pass called the Cumbre. The ascent was not very steep, but the journey was rather difficult, the road being only just wide enough in certain places to permit two laden mules to pass. The Government had never gone to the expense of repairing the roads, and in winter time the muleteers cleared them on their own account. On the eastern side, also, there was very little vegetation, not sufficient to support the mules; but on the western side the descent was rapid, and vegetation luxuriant. In the same range, crossed by the road at the Cumbre (12,000 feet), and at no great distance from it, though unseen there, is the highest peak in Chile—the celebrated volcano of Aconcagua—well seen from Valparaiso, where it appears a perfect cone, which he believed to be little less than 15,000 feet high. Admiral Fitzroy had described it as being higher than any of the Himalayan peaks; but he must have been mistaken in his calculations, no doubt in consequence of the difficulty in getting a suitable base for a trigonometrical measurement. He (Mr. Miers) had often seen it void of snow, and as the snow-line in that latitude is about 15,000 feet, it is manifest that the mountain *cannot much exceed that height.*

Major RICKARD said, Professor David Forbes had estimated it at 23,400 feet, and Mr. Lloyd formed one of a party who ascended it to a height of between 16,000 and 17,000 feet.

Mr. LLOYD said he had been for several years Engineer to the Government of Chili, and had not the slightest doubt of the possibility of making a line of railway from Mendoza to Valparaiso. The only advantage the southern route could have would be that its highest point was 2000 feet lower, but that difference was of little importance; for it was now quite possible to cut through a chain of mountains without any great difficulty. The Andes were not a difficult range to cross. The descent on the western side was very steep, because from the mountains to the sea was not more than 80 miles; but the preferable route was by the Uspallata Pass, a line of railway which he had carried from Santiago, now ran to Santa Rosa and to the base of the Andes. On the northern route there were several towns,—Mendoza, San Luis, and Rosario. The population living between these places was numerous, and the towns themselves were upwards of 250 miles apart, but the civilizing influence of a line of railway through those towns would be considerable. He was sorry to say that he had not achieved the distinction of ascending the Aconcagua as Major Rickard had supposed. The party which he accompanied ascended the main Cordillera; but their knowledge of the geography of the country was so meagre, and the maps they had were so imperfect, that they did not find the cone of Aconcagua until they had reached the summit of the Cordillera, beyond which their cattle could not go. They, however, found coal-measures at an altitude of 12,000 feet. It would not pay for conveyance to Valparaiso, having been subject to volcanic action; but the amount of copper in the range was almost beyond belief. Unfortunately it was almost too high to make working profitable, that portion of the Cordillera being only open for three or four months in the year. It was quite clear the commerce alone could never support a railway. From Chili the only traffic would be in copper; while from the other side only tobacco and cattle would be conveyed. As a profitable investment, therefore, a line of railway would completely fail. The chief product on the frontier of Bolivia was sugar; but at Tucuman, American refined sugar was actually selling at a less price than the native grown.

Mr. RANDOLPH CLAY (late United States Plenipotentiary in Peru) said the engineering difficulties of carrying a line of railway from Mendoza to Santiago, were in no sense insurmountable. The Chief Engineer of the Peruvian Government was at present engaged in constructing a railway from Lima across the Andes at a height of about 13,000 feet, and he had met with no very great difficulty. The remains of the ancient aqueduct could still be traced, crossing the Andes at a height of 12,000 feet; and surely if the engineers of the Incas, who had no acquaintance with iron, could carry out such a work, modern engineers need not fear that a line of railroad would be impracticable.

Mr. C. MARKHAM drew attention to the marked effects of prevailing winds on the vegetation of South America. Where the trade-winds blow over the Brazilian empire a dense tropical forest extends to the foot of the Andes, whilst on the western coast of the continent there is an arid sandy desert. To the south of the trade-winds, however, where the western winds blow on the coast of Chili, there is a luxuriant vegetation. These west winds again appear to be wrung dry by the Andes, and on the eastern side there is nothing but an arid waste, although further north, in the latitude of the trade-winds, the vegetation is most dense. He should be glad to hear more concerning the *medanos*, or sandhills, which, on the pampas, are described as circular, having a hollow in the centre, frequently below the level of the plain. In the *deserts of Peru the* sandhills are semicircular, a form which could be easily

understood and accounted for by the direction of the prevalent winds; but he did not understand how circular hills with hollow centres could be formed.

Major RICKARD said the hills were composed of fine sand, apparently impervious to water, and lakes were frequently found in their centres. The foundation was commonly hard clay. He wished it to be understood that the public would not be asked to subscribe to the proposed railroad across the Andes as a commercial undertaking simply. The Government, he believed, were quite ready to give a guarantee of 7 or 8 per cent. It was never contemplated that the line would produce sufficient to pay working expenses.

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2. *On the Ruined Cities of Central America.* By Captain LINDESAY BRINE, R.N., F.R.G.S.

This Paper will be printed in full in the 'Journal,' vol. xlii.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Dr. Livingstone's Letters to Sir Thomas Maclear.**

BY the last mail from England Sir Thomas Maclear received a batch of letters from Dr. Livingstone, which he has been good enough to place at our disposal; and a large number of astronomical observations for geographical positions, and measures for elevations—all in the original, as noted from time to time by the Doctor, and which will occupy many months to reduce. These observations, and the results obtained from them, shall, of course, be reserved for Dr. Livingstone's own disposal when, as may fervently be hoped, he will emerge from the inner darkness of Ethiopia to publish directly the marvellous tale of his great discoveries. We may remark, however, in passing, that nothing could be more elaborate and careful of their kind than these observations, even long after "the chronometers were dead." Dr. Livingstone was as much the devoted workman when watching the midnight sky, as when clambering his way through forests, or paddling through marshes on his weary "eighteen hundred miles' tramp." Accompanying the observations there is a rough sketch-map of the country westward of Tanganyika, indicating the position of the five great lakes, and the strange network of river-systems by which they are connected with each other. In addition to the two long letters subjoined, we give the following extracts from others extending down to March last. In one he says:—

"Here I take care to keep my own counsel. I think that Cazembe is near 27° E., but will be glad to hear better about it from you. Bangweolo may be about 28° E. The Portuguese guides showed skill in leading them to a narrow part of the Chambeze to cross over, but it is a wonder they did not speak of Bangweolo. The Cazembe of their day, too, was east of the present man. They took the Chambeze to be our Zambezi, and so did I, and lost a great deal of

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* *Reprinted from the* 'Cape Monthly Magazine,' October, 1872.

time thereby. Zambezi is not the name of the southern river at all. We took the name from the Portuguese corruption; the real name is Dombazi, and I ought not to have been misled as I was to think Chambeze the same river."

In another note he says:—

"My despatches will give you an idea of what I have been doing, but I am not yet satisfied with my discoveries. When I am I shall go home and satisfy others; but I must, if possible, re-discover the ancient fountains as soon as Mr. Stanley sends me fifty free men from the coast. I have, through the pluck and the great generosity of James Gordon Bennett, of New York, abundant supplies of all I need. My agent at the coast failed me by unwittingly employing slaves and slave-dealers to forward stores to me. This has caused me the loss of two years' time and 1800 miles of useless tramping, and how much money I cannot say; but all will come right at last. It has brought me face to face with the slave-trade carried on by our Banian fellow-subjects, and if my discoveries help towards its suppression, I will not grudge the trouble and toil it has caused."

We now subjoin the following:—

"*To* Sir Thomas Maclear.

"Manyema, November, 1870.

"I have no paper in Manyema, so cut a leaf out of my cheque-book to add that west of the Lualaba there are two others of the same name; these unite and form a lake, which I shall call Lake Lincoln, in honour of the man who, by passing the amendment to the United States constitution, gave freedom to four millions of slaves. The united river out of Lake Lincoln, this Lualaba, and Tanganyika form three great arms. Ptolemy has but two. The sources of these western Lualabas are at a remarkable mound, which gives forth on its north two gushing full-grown streams that become great rivers. On its south it gives out other two fountains, one at which a man cannot be seen across; it is the fountain of the Leeambye, or Upper Zambezi: the other, called Lunga, is, further down, Luenge, Kafugi, or Kafue; these are probably the Nile fountains mentioned to Herodotus by the Secretary of Minerva in the city of Sais, in which he said 'half the water went to Egypt, the other to Inner Ethiopia.' I heard of this famous mound and fountains 200 miles off, to the south-west; again on the south-east, 150 miles distant; again on the east and north-east, 180 miles distant; and here, north-north-east. Many intelligent Arabs who have visited the spot, and had their wonder excited as much as the natives had, give substantially the same account. I feel so certain on the matter, that I have given English names to the fountains by anticipation. Mr. Oswell and I were told positively at Linyanti that the Liambai and Luenge, or Kafue, came from the same spot; and this information, culled so far off, turns out to be quite true. This Lualaba is a mighty stream. Poor Speke's little river from Victoria Nyanza is 80 or 90 yards broad. Had he come west into the trough of the great valley of the Nile, he would have found this far south of his (as he called it) White Nile, from 4000 to 8000 yards wide, and always deep. Then another west of it again and equally large proportions. The watershed from which the springs of the river of Egypt do unquestionably arise is in 10° to 12° s., and between 700 and 800 miles long from west to east. I feel a little thankful to Old Nile for so hiding his big head as to leave all the theoretical discoveries out in the rain. I have been sorely baffled in Manyema, chiefly by water, and by cowardly, lying, stealing, unclean liberated slaves as attendants. My Johanna men fled in sheer terror of the Mazitu or Batuta, and were excusable; the rest had all been slaves and

of the criminal class in their own country, and remained with me only from fear of being caught and made to work again. Elsewhere I was in a measure independent, for the country people carried from village to village. Here nothing will induce Manyema to go into the next district, for fear, they say, of being killed and eaten. I was thus at the mercy of the slavelings, who being fed and lodged by slave women, whose husbands were away for ivory, would do nothing but flaunt about in the gaudy gear and clothes I had bought them. Some, to ingratiate themselves with the Arabs, became eager slave-hunters, and I have to wait for other men from the coast. The Manyema country is, I should think, incomprehensible to your farmers in the dry south. I crossed fourteen rivulets in one day, each from knee to thigh deep. A party of my friend Muhamad Bogharib was five hours in a river in flood, with a man in a small canoe sounding among the trees for parts only breast deep; in another river they were two hours in crossing, and all from breast to neck deep; the mud, mire, or 'glaur' is grievous. The forest impenetrable even to the fierce vertical sun—one does not see it except at the clearances round each village. If I had men who could work a canoe, four or five months would finish all I have to do. The traders cannot spare their people, for ivory collecting is like gold digging. No trader ever came here before, and the tusks were left in the terrible forests where the animals were killed. The people, if treated civilly, readily go and bring the precious teeth, some half-rotten or gnawed by the teeth of a rodent called 'dezi.' I think that mad naturalists name it *Aulocaudatus Swindernianus*, or some equally wise agglomeration of syllables. Food is very abundant and very cheap. Hundreds of canoes come over the broad river, if not windy, and hold market for flour, cassava, beans, ground-nuts, oil, fish, goats, pigs, sheep, any slaves, grass-cloth, and utensils of iron.

"My chronometers are all dead. I hope my old watch was sent to Zanzibar, but I have got no letters for years save some three-year-olds at Ujiji. I have an intense and sore longing to finish and retire, and trust that the Almighty may permit me to go home.

"I have had no medicine; some detained at Unyanyembe, near Kazeh, unaccountably, though sent for twice with goods to pay the carriers. My love to all at the Observatory.

"Affectionately,

"David Livingstone."

"*To* Sir Thomas Maclear *and* Mr. Mann.

"My dear Friends, "Ujiji, 17th November, 1871.

"When I came here in 1869, I was excessively weak from a severe attack of pneumonia, brought on by getting drenched to the skin once too often in Marungu. I was like one far gone in consumption, with a frightful cough, not quite a walking skeleton, for I could not go fifty yards; but I copied all my astronomical observations from the coast onwards, and made sketch-maps on tracing-paper for you and home, wrote about forty letters, watched for three months the majestic flow of the Tanganyika to the north by means of miles of confervæ and other aquatic plants, by the waters of inflowing rivers being at once bent away in the same direction, by the water of shut-in bays having a river at their ends being distinctly brackish, while out in the stream it is quite sweet, by the wear of the banks on the east side, which is common to all rivers in this regions in north and south reaches.

"Ujiji, for instance, is a full mile east of where it stood in the memory of persons still living, and by the stumps of trees, as of the palm—oil-palm—standing many yards from the present shore, where, had there been water formerly, they could not have grown. These and other points led me to conclude that it was a riverine lake; if not hideously pedantic, say a lacustrine river. *I was going to explore it*, but had been robbed of most of the goods I had

sent to be placed in depôt here, and I found that the Ujijians meant to plunder me, as they seem to have done Burton and Speke, and therefore concluded that it would be best to spend what few goods I had in following the central line of drainage of the great Nile Valley down, and leave Tanganyika for an upward or southern return. The packet of forty letters, observations, and maps was never more heard of. The robbery of my goods was the work of a slave of the Governor of Unyanyembe (near to Speke's Kazeh), and uncharitable people think that its loss was connected with his wish to prevent evidence going to the coast. He has kept a long box of mine by him since 1868, though I sent for it twice, and sent forty-eight yards of calico to prepay carriers. The detention may be caused by a desire to fall heir to two English guns in it. I wished the medicines therein chiefly, for I have long been without any. Well, away I went about north-west from the islet Kasenge, and two hours a day were all I could accomplish; but by persevering I gained strength to enter the country of the cannibals, who are called Manyuema, but by Arabs Manyema. I now found myself in the first large bend which the great Lualaba makes to the west. The country is extremely beautiful, but difficult to travel over. High mountains rise on all hands and are covered with mantles of different shades of green, from the woody vegetation up to their tops; the forests are primeval, and the sun, though right overhead, can penetrate only at midday by sending thin pencils of rays down into the gloom. If one of the giant trees falls across a path, it forms a wall neck high, to be climbed over; so many climbers come down with it, you cannot go round about, or indeed anywhere but in the old path. The grasses in the clearest spaces are of the Megatherium species; through them nothing but elephants can walk, and we worm our way along elephants' walks alone. It is clear day around villages alone. Nothing is more surprising than the great numbers of running rills, rivulets, and rivers, and the great size of the lakes. The mud from the rich clayey soil in Manyema is terrible; one crosses every now and then a broad patch of slough; one in a valley taken possession of by the Muale palm, from which here, as in Madagascar, grass-cloth is made, is very grievous and groan-compelling, because all passage is blocked up by the leaf-stalks as thick as a strong man's arm falling off and leaving a path traversed by elephants and buffaloes as well as by men. You spalsh along, thinking it all about calf-deep, but at points the subsoil has given way under the enormous weight of the elephant, the mire has filled all to one level, and instead of going in calf-deep, it is thigh-deep, and you flop on to a seat soft enough, but not luxurious.

"No traders had ever come into Manyema before; and now the half-caste Arabs, who are just facsimiles of Griquas or other half-Dutch folk, got into a sort of frenzy on finding that all ivory which has fallen for ages just lay in the dense forest where the animals had been slain; and if the people were civily treated, they brought the precious tusks to them for a few thick copper bracelets. One trading party I met had 18,000 lbs. weight of ivory; another I came part of the way out with had 35,000 lbs. of it: none came empty home. But they found, also, that the Manyema, who are really terrible fellows among themselves, with their big spears and large wooden shields, were terrified by the report of guns; and when they fled in fear, the gallant blackguards, like our friends further south, captured the women and children in crowds to be carried to the coast. The women are so much prettier than the Zanzibar slaves that all were eager to obtain the really pretty light-coloured Manyema women; and I was compelled to witness scenes I wish I had never seen. They all treat me with respect, and are very much afraid of being 'written against.' But they consider the sources of the Nile to be a sham; the true object of my being sent is to see their odious system of slaving; and if, indeed, my disclosures should lead to the suppression of the East Coast

slave-trade, I would esteem that as a far greater feat than the discovery of all the sources together. It is awful; but I cannot speak of the slaving—it is not trading—it is murdering for captives to be made into slaves—for fear of appearing guilty of exaggeration. I made three exploring trips in different directions in Manyema. Nobody knew where the great river Webb's Lualaba ran. When I went west to buy a canoe, I found myself among people who had been cruelly treated by the slavers, and was obliged to return; then north, and could not find *the* river there, nor could I learn anything about it, for the Manyema never travel to the next district, for fear, they say, of being killed and eaten. I had to give up the northern road by the rains and fear of another pneumonia, which is worse than ten fevers—treated by my medicine, and not by the diet given to Bishop Mackenzie with the same name. When the rain ceased I went north-west, not knowing that the river there ran W.N.W., and might be the Congo,—a mare's nest I had no wish to find.

"Here my feet, which never failed me before, gave in, and when torn by hard travel, instead of healing kindly, as heretofore, irritable eating ulcers eased both feet, and I had to limp back to Bambarre, which, though the very Tipperary of Manyema, has a sensible chief, where I was laid up for many months. The packet mentioned contained cheques for money, and requests for other men and means. It never reached; but a note given to a buffalo-driver was secreted on his person, because he knew that on its production his wages depended. This alone of all my Ujijian letters of May, 1869, reached the coast. Unfortunately, some 500*l.* worth of goods were committed to a rich Banian at Zanzibar, who gave his own slaves instead of men, and at 60 dolls. a year, while the wages of freemen there are only 25 dolls. per annum. He placed the caravan under a drunken half-caste Moslem tailor, who at once got soap, brandy, opium, and gunpowder for retail on the journey, all the expenses being paid out of my stores; and when he came to Ujiji his own private speculation was finished, and he would go no further. He had spent fourteen months in the way, though the distance could easily have been accomplished in three; and here my drunken Mohammedan smouse lay intoxicated for a month at a time, the palm-toddy and pombe all bought with my beads. He then wrote to the Governor of Unyanyembe (though called a governor, he is only a Banian trade agent), stating that he had sent slaves to Manyema, who had returned and said that I was dead. He, however, knew perfectly that I was near, alive and well, and waiting for him, from men who passed me from a camp beyond Bambarre, where I had previously wintered, and he begged permission to sell off all my remaining goods. But he divined on the Koran, and found that I was really dead and gone, and forthwith sold off all; and I returned to find all my 500*l.* or 600*l.* worth of goods bartered away for slaves and ivory to Shereef—so my man was called,—and I had not a single yard of calico or string of my fine beads left. It was a mercy he left me a little coffee and sugar, and some few unsaleable beads, evidently exchanged for my fine dear ones, and then the moral idiot came forward to shake hands with me. . . . . I shall be blamed, too, for Shereef's vileness, though the voice of the blamers is to me only that of the penny trumpet. But seven of the slaves came up to me at Bambarre, and glad I was to see them; but Shereef would not allow them to bring my own goods. They at once refused to go any further—swore so positively by Muhamed Razule that the Consul had ordered them not to follow, but force me back, that I had to read over the Consul's orders, to be sure that my eyes did not deceive me. I forced them on by fear of pistol-shot, but it was against the grain; and they at last plotted my destruction, and spoke so loudly, that my friends dissuaded me from going further than Nyangwe, in lat. 4° 10′ down the Lualaba. I was near a further great lake on this central line, and only eighty miles from Lake *Lincoln on our west,—in fact,* almost in sight of the geographical end of my

mission,—when I was forced to return between 400 and 500 miles. In getting to Nyangwe I went west, and, like the river, made some twenty or thirty miles of southing. A sore heart, made still sorer by the sad scenes I had seen of man's inhumanity to man, made this march a terrible tramp: the sun vertical, and the sore heart reacting on the physical frame, I was in pain nearly every step of the way, and arrived, a mere ruckle of bones, to find myself destitute. I felt as if dying on my feet, and lost spirit. I wrote that I was like the man who went from Jerusalem to Jericho, but no good Samaritan would come the Ujijian way. When, just as my thoughts got to the lowest verge, a caravan was reported, and one of my men ran in breathless haste, gasping out, 'An Englishman coming!' and back he darted to meet him. The American flag at the head of the caravan told of the stranger's nationality. It was Henry M. Stanley, travelling correspondent of the 'New York Herald,' sent by the son of the editor, James Gordon Bennett, jun., to find out where your servant was, if alive, and, if dead, to bring home my bones. With characteristic American generosity I was free to all the goods he had brought at an expense of 4000*l.*! I am as cold and non-demonstrative as we islanders are reputed to be, but this kindness was overwhelming. Here was the good Samaritan, and no mistake. Never was I more hard pressed—never was help more welcome: my appetite returned—I ate four meals a day, instead of the miserable scanty two daily repasts I forced on myself, and in a week felt getting strong again.

"Mr. Stanley having men and means, we at once went down Tanganyika, as I learned from him that this was an object esteemed important by geographers. We have found no outlet. The Lusize River flows in, not out, and except the small lagoon called Kivo, which too, with the River of Luanda, gives its water into Lusize, the natives know of no large lake. A waterfall was reported to me as existing between Tanganyika and another lake north of it; but here, in lat. 3° 18′ 49″ in the delta of Lusize, none is known, nor do the people of Luanda know Baker's Lake. It cannot be so near this as he thought. Why this is so fresh, and water flowing in from many salt-marshes, and has done for ages, I cannot conceive, if no outlet exists; but we cannot find it. It is very deep, 354 fathoms, but the line broke in coming up, and the rest was stolen by night, so I am lineless now. All the chronometers are dead; no accident happened to any of my instruments, but the climate of Manyema was fatal. If Speke's longitude of Ujiji is correct, and my reckoning of Lualaba not very far wrong, the great river is some 5° west of Tanganyika, or in 24° to 25°. But I have been trying to puzzle Mr. Mann and you by placing the weight of a conical bullet on the key, and thus making the chronometer go. Then ☉ Alt. and ☾ ☉ and ☾ ☪ distance, then ☉ Alt. again in succession a number of times, in the belief that the first and last ☉ Altitudes will give the error in the rate of going, for the local times of the distances. If you cannot manage to squeeze a longitude out of these, no one else will. I have one set far down Lualaba, and one at the lower end of Tanganyika, in the delta of Lusize, which is near the longitude of Ujiji. This is the only thing I can think of doing, should it please the Almighty to help me to the ancient fountains mentioned to Herodotus by the Secretary of Minerva in the city of Sais, in Egypt. I have better reason to believe in their existence than in the outflow of Tanganyika. I have been told of four fountains which issue from beneath an earthen mound, and flow two north and two south, not once but many times over—on south-west 200 miles off; on south-east as far away; on the east 150 miles distant, and again on north-north-east; and cannot doubt their existence. But I do not put it stronger than conjecture, though I remain for a trip there, and have an intense desire to return home. Lualaba, or Webb's Lualaba, is a mighty stream, from two to three miles broad, and never can be waded at any point or at any time of the year. The population in many parts is prodigiously large. Men undoubtedly cannibals, but not ostentatiously

so. Women never partake of human flesh, nor of the Soko, as the gorilla is there called. I could not admire him. He is sometimes seen in the forest walking upright, with his hands on his head as if to steady his loins, but on sight of man takes to all fours. He is not handsome: a bandy-legged, pot-bellied low-browed villain, without a particle of the gentleman in him; but he has a good character from the natives. The Bakuss, west of Lualaba, cultivate coffee, and drink it after meals, highly scented with vanilla. I have to go to Unyanyembe for goods and men. A second set of goods, value 500*l*., was again committed to slaves, and they lay at Bagamoio feasting for three months and a half at least—they say four—then came on to Unyanyembe, near Speke's Kazeh, and a war occurred, which gave them good excuse to lie there still; so I go back about a month to prevent the loss of all again. Some simple people believe that Mohammedans do not drink spirits or fuddle like Christians. My experience has shown me that drunkenness and worse vices are more common among them than among Christians; and during all their long intercourse with the Africans here, not one attempt has ever been made to proselytize.

"With kind salutations to all yours, I am affectionately yours,

"DAVID LIVINGSTONE."

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2. *Remarks on the Deep-Water Temperature of Lochs Lomond, Katrine, and Tay.* By ALEXANDER BUCHAN, F.R.S.E., Secretary of the Scottish Meteorological Society.

In two communications made by Sir Robert Christison to the Royal Society of Edinburgh, in December and April last, on the deep-water temperature of Loch Lomond, from observations made by him with a Miller-Casella thermometer, these important facts were stated:—

1. On 12th October, 1871, the temperature at the surface was 52·0°, from which it fell, on descending, till at 300 feet below the surface it stood at 42·0°; and this temperature of 42·0° was uniformly maintained at greater depths, or to 518 feet, the depth of the loch at the place of observation.

2. On 18th November following, the surface temperature was 46·0°; at a depth of 250 feet, 42·25°; at 270 feet and lower depths, 42·0°.

3. On the 10th April, 1872, the temperature at the surface was, 43·0°; at 150 feet, 42·0°; and from 200 feet to 594 feet, 42·0°.

Hence it appears that there is a stratum of water of considerable thickness, at the bottom of this loch, of uniform temperature; that the upper surface of this stratum of deep water of uniform temperature was about 100 feet higher on the 10th of April than it was in the beginning of winter, or on the 18th November; and that this deep-water temperature probably remains constantly at, or very near, 42·0°.

During this period the temperature was under the average of the season on 51 days, the deficiency amounting to a mean of 3·4°; and above the average on 94 days, the excess amounting to a mean of 4·0°. The most markedly mild period extended over 69 days, viz. from 11th January to 19th March, during which the temperature was on an average 3·9° above that of the season; and the temperature was, for the whole period of 145 days, 1·4° above the average.

It may be concluded that in ordinary winters the stratum of water of uniform temperature will be thicker than Sir Robert Christison found it to be this year in the beginning of spring; in other words, that the temperature of 42·0° will be nearer the surface than 170 feet.

The late Mr. James Jardine, C.E., made observations on the temperature of Lochs Tay, Katrine, and Lomond in August and September, 1812, and again in September, 1814, and found the deep-water uniform temperature of these lochs to be 41·9°, 41·7°, and 41·5°. These observations were made in the summer and early autumn, or when the temperature of the sea and of lakes is about the annual maximum. Taken in connection with Sir Robert Christison's observations, they warrant the conclusion that the deep-water temperature of Loch Lomond remains during the whole year either absolutely at, or very nearly at, 42·0°.

Mr. Jardine's observations also show that this is not a peculiarity of Loch Lomond, but that it is also a characteristic of Lochs Katrine and Tay, and most probably of other deep waters.

The mean annual temperature of the air at Loch Lomond, as determined by the mean at Balloch Castle, at the foot of the loch, calculated on the thirteen years' average ending 1869, is 48·0°, which is 6·0° higher than the uniform deep-water temperature of the loch. The deep-water temperature is, therefore, not determined by the mean annual temperature of the air, over this part of the earth's surface.

From Forbes' 'Climate of Edinburgh' it is seen that the temperature there is under the annual mean from the 21st October to the 26th April. Assuming that this holds good for Balloch Castle, then the mean temperature of the air for these 188 days is 41·4°.

The close approximation of this temperature of 41·4° to 42·0°—the deep-water temperature of the loch—is such as to suggest *that it is the mean temperature of the cold half of the year which determines the temperature of the lowest stratum of water at the bottom of deep lakes*, so long as the deep-water temperature does not fall below that of the maximum density of the water. As this principle, if established, would be of great importance in many questions of physical research, such as the deep-water temperature of the Mediterranean Sea, which Dr. Carpenter has very accurately ascertained, in its connection with the larger question of general oceanic circulation, it well deserves further investigation.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Issued May 26th, 1873.]

SESSION 1872–73.

Fourth Meeting, 13th January, 1873.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

Elections.—*Thomas Atkins, Esq.; Captain E. W. D. Baylis; R. Henry Brunton, Esq.*, F.G.S.; *John Henry Buxton, Esq.; John Wilson Carillon, Esq.; Alfred Aug. Creswell, Esq.; William H. Harper, Esq.; Captain Robert Home*, R.E.; *F. H. Ward Jackson, Esq.; Frederick D. Lewin, Esq.; H. Ford Searight, Esq.; Griffiths Smith, Esq.; Rear-Admiral William Houston Stewart*, C.B.; *Charles Teede, Esq.; Charles Whitehead, Esq.*, F.S.A., F.L.S., &c.

Presentations.—*Frederick Drew, Esq.; Alexander Mackintosh, Esq.; Richard Bird, Esq.; William Henry Plaister, Esq.; Lieut. J. A. MacVicar* (93rd Highlanders).

Accessions to the Library from December 9th, 1872, to January 13th, 1873.—A Collection of Photographs of San Francisco, the Yo se-mite Valley, &c. Made by E. M. Watkins, of San Francisco. Presented by J. H. Maclure. Address to the New Zealand Institute. By Sir G. F. Bowen. 1872. 'Essai d'Orographie Sous-Marine de l'Océan Atlantique.' Par Jules Girard. 'Classification de 100 Caoutchoucs, &c.' Par M. Bernardin Gand, 1872. Donor the author. 'Alturas Tomadas en la Republica de Colombia, 1868-69.' Por W. Keiss y A. Stubel. Quito, 1872. 'Minnesteckning äfver Erik Gustaf Geijer.' Af F. T. Carlson. Donor the author. 'Journey through the Wilderness from Trinidad to Para, Brazil, &c.' By H. A. Wickham. 1872. Donor the author. 'Flora of Tropical Africa.' By Daniel Oliver. Two vols. 1858-1871. Donor the author. 'Report of Scientific Researches,' &c. By Dr. Carpenter.

1872. Donor the author. 'Geology of the Straits of Dover." Comparative Agriculture of England and Wales.' By W. Topley. 1871. Donor the author.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF DECEMBER 9TH, 1872.—Germany: Hesse Darmstadt on two sheets. (Sent as specimens of cartography.) Presented by the Director of the Hessian General Staff. Map of the Garo Hills (Assam), a sketch made in the season of 1872. Published at the Surveyor-General's Office, Calcutta, Oct. 1872. Presented by C. R. Markham, Esq., C.B. Map of the Tea-localities of Upper Assam. 2 copies. Presented by Messrs. Moore and Jupp. Southern part of the Island of Luzon, showing the route of F. Jagor. Published and presented by R. Kiepert. Berlin. Four Photographs of the town of St. Paul de Loanda, from different points of view. Presented by Lieutenant W. J. Grandy, R.N. Map of Soudan, showing the routes of Gerard Rohlfs in Northern Africa. 1866. Map of Hoch-Sennaar, showing the route of Ernst Marno in 1870-1. A Map showing the routes of Livingstone and Stanley and other explorers in Central Africa, from 1798 to 1872. 2 copies, coloured. Central Africa: a Map showing the route of Gerard Rohlfs from Gudja to Lagos. 1866-7. Presented by Dr. A. Petermann. Three sheets of the 'Weather Map,' issued by the War Department of the United States, on Dec. 3rd and 4th, 1872, with the daily bulletin, &c. Presented by Brig.-General A. F. Myer, Chief Signal Officer, Washington, U.S. Map of the Argentine Republic, including Uruguay and Paraguay. By Pablo E. Coni. 1868. Brazil: Map of the Province of Minas Geraes. By H. Gerber. With 78 pages of letter-press. Presented by C. H. Wallroth, Esq. Buenos Ayres. Switzerland: fourteen specimens of maps of various parts of Switzerland. Presented by H. Müllhaupt et Fils. Berne. Two Admiralty Charts, viz., No. 2282, Arctic Ocean and Greenland Sea, 1872; No. 2347, Japanese Islands, 1871. Wind and Current Charts, for Pacific, Atlantic, and Indian Oceans. Presented by the Hydrographic Office, through Admiral G. H. Richards, C.B., F.R.S.

The PRESIDENT announced that on the 16th of the previous month a very influential deputation, consisting of members of the Arctic Committee of the Society and representatives from most of the other scientific Societies of London,* waited upon the Chancellor of the Exchequer and the First Lord of

* The following gentlemen formed the deputation:—Major-Gen. Sir H. C. Rawlinson (President R.G.S.), Sir Henry Holland, Bart. (President of the Royal Institution), Dr. J. D. Hooker (Director of the Botanic Gardens, Kew), Dr. W. B. Carpenter, Admiral Sir George Back, Admiral R. Collinson, Admiral E. Ommanney, Captain Sherard Osborn, R.N., Mr. C. R. Markham, C.B., and Mr. R. H. Major. Admiral Sir Alexander Milne (First Sea Lord of the Admiralty), and Admiral Richards (Hydrographer to the Admiralty) were also present.

the Admiralty, to press the subject of an Arctic Expedition upon their notice. The case was laid fairly and fully before them, and Mr. Lowe and Mr. Goschen having taken time to consider the matter, a letter was received from Mr. Lowe, to the following effect:—

"11, Downing Street,
"DEAR SIR HENRY RAWLINSON, December 31st, 1872.

"Mr. Goschen and I have carefully considered the documents which you have laid before us with regard to the proposed Arctic Expedition.

"We do not find in them anything which shows that there is any pressing reason why the Expedition should be sent this year.

"We give no opinion as to the expediency of such an Expedition at a future time; but we are clearly of opinion that it would not be right to send out a second Scientific Expedition precisely at the moment when the public revenue has to bear the main burden of the expenses of the operations entrusted to the *Challenger*.

"I believe it has been erroneously stated that the *Challenger* Expedition involves very little expense. That is not so: the cost has already been considerable, and nothing has been spared to ensure success. There will be further an additional annual outlay for three years.

"Under these circumstances, we regret that we cannot recommend the sending an Exploring party to the Arctic Ocean as a Government Enterprise this year.

"Believe me, yours very truly,
(Signed) "ROBERT LOWE.

"*Sir Henry C. Rawlinson*, K.C.B."

Although this letter was unfavourable to the application, it was not altogether discouraging. It would be observed that there was a special reservation, that the assistance was not to be given this year, and any sanguine geographer might thus infer that the application would meet with more success another year. At any rate, the Council had decided to send a reply to the effect that they regretted having met with a decision unfavourable to their hopes, but, at the same time, they were glad to find that Her Majesty's Government did not express any opinion as to the expediency of sending an expedition at some future time; and they were therefore led to indulge a hope that the additional arguments which they might be able to advance might prevail upon the Government next year, or even earlier, to accede to the application so far as to organise an expedition which would be ready to leave England in the spring of 1874. It was to be hoped by that time our elastic revenue would have recovered from the very severe strain which had been placed upon it by the requirements of the *Challenger*.

The papers to be read that evening related to Japan, and had been sent to the Society by the officer in charge of the British Legation at Yedo. They derived additional interest from the circumstance that the Minister from Japan and his Secretary were then present, and had been proposed that day as Fellows of the Society. Until quite recently Japan was popularly supposed to be a barbarous country, but it had been suddenly found that she had become a competitor with the most advanced European nations in every branch of art and industry. She was so much advanced that it was announced in the papers that the idea was entertained of adopting a new religion, a new language, and a new code of morals. That was as rapid a stride as any nation could be expected to take in a couple of years. It gave him great pleasure to welcome the Minister and his Secretary as Geographical colleagues, and he had suggested to them that on their return to Japan they should institute a Royal Geographical Society there.

Mr. MARKHAM *then read the following Papers*:—

1. *Ascent of Fuji-Yama.* By J. H. GUBBINS, Esq., Student Interpreter, Yedo.

[ABSTRACT.]

THE Volcano of Fuji-Yama lies about 90 miles E.S.E. of Yedo, and is the resort of an immense number of pilgrims from all parts of the island. They may be met with at all hours of the day and night, wending their way in small bands, distinguished by some peculiar badge or mark, and uttering cries of encouragement to each other.

Mr. Gubbins and party left Yedo on August 5th, 1872, and followed the road previously taken by Sir R. Alcock, in 1860, as far as Hakoni, situated on the border of the lake of the same name, the usual route being to cross the lake and strike the road on the further side. The party were quickly embarked; on the passage across, the entrance to a large aqueduct was seen on the left bank, said to pass underground through the hills bordering the lake, and connecting with the Kisagawa, a river flowing into the sea between Mishima and Numadzu. It was believed to have been constructed several hundred years ago, for the purpose of keeping the rice-fields of those provinces well supplied with water during the dry season. Its length was rather more than three-quarters of a mile, with a height of about 5 or 6 feet. Landing on the northern shore of the lake, the party crossed the Otomizaka range of hills to the village of Subashiri, near which the road was bordered for some distance by a lava-bed, shaped like an ordinary mountain-stream. The village situated at the base of Fuji-Yama is a halting-place for pilgrims, and one of the four places from which it is customary to ascend the mountain; the others being Yoshida on the north, Tuyama on the south-east, and Omiya on the south.

Owing to bad weather, the party were detained two days at Subashiri before making the ascent. The track for the first five miles was easy, and could be accomplished by pack-horses; but for the next three hours it passed through a dense wood covering a considerable part of the lower half of the mountain: on emerging from the wood the remaining portion of the ascent was much steeper, and the path became hard and stony. At this point the track followed in the ascent and that by which the descent is made diverge. There are numerous shrines on the way up the mountain, where pilgrims are expected to contribute a certain sum; there are also ten resting-places equi-distant on the upper part of the mountain, usually erected in some sheltered spot, under the lee of a rock or boulder, as a protection against avalanches. After a long climb, the eighth of these was reached at sunset, and the effect, as seen from this point, was gorgeous and magnificent in the extreme.

Preparations were made here for passing the night, the intense cold necessitating the lighting of a wood-fire; but, as the huts are constructed without any attempt at ventilation, the effect of the smoke upon the eyes was exceedingly painful. The remainder of the ascent was accomplished by sunrise on the following morning, August 10th; the last bit was very steep, and the party felt considerably relieved when they at length gained the summit. The crater is of an irregular oval shape, and about 300 feet deep. The cloudiness of the atmosphere prevented their obtaining so good a view from the top as was seen from the resting-place of the previous evening.

The descent was made by the northern route to Yoshida, the forest extending far higher up the mountain on that side than on the side near Subashiri, and the slope more gradual. At the foot of the mountain, about eight miles above Yoshida, is a cave with a low entrance, in which the goddess Konohana Sukuya Himé no Mikoto, or tutelary deity of Fuji-Yama, is said to reside, and pilgrims from this side are obliged to enter the cave for the purpose of soliciting her aid, before commencing the ascent. An attempt to explore it 700 years ago by a Japanese soldier is said to have aroused the ire of the goddess, who caused him to beat a hasty retreat.

Yoshida is composed of two villages, situated between the lakes of Kawaguchi and Yamanaka, and is 23 miles from Kofu, the chief town of Koshiu. Here the mulberry cultivation commences and extends all the way to the Koshiu-Kaido, or great road from Yedo to Kofu, and along that road as far as Hachiôji. The Koshiu-Kaido is one of the few great highways in Japan, and is about 100 miles in length. At Yoshida large quantities of foreign potatoes are cultivated, and a small trade in silk is carried on; it is also the favourite place from which to ascend the mountain, the resting-places on this side being of a superior character, and the ascent undoubtedly easier. Accommodation is good, and provisions plentiful and cheap, forming a striking contrast to the villages on the Hakôné side. Heavy rains detained the party here until the 13th, when they started on their way back to Yedo, by the Koshiu-Kaido, which for some distance follows the valley of the Banniugawa, a a river rising at the foot of Fuji-Yama, the hills on either side the valley being covered with mulberry-plantations, interspersed with barley.

At Yámuru, where they next halted, silk-weaving is carried on to some considerable extent, the looms being of the most primitive construction, requiring only one woman to each. Near Sarobashi the road crosses the river by a cleverly constructed suspension-

bridge, the supports being fixed in the rocks on either side of the river. Several small villages were passed through the next day, and Uyenshara was reached in the evening. Being market-day, the place was thronged with visitors from the surrounding villages, and presented a busy, lively scene. A 20 miles' walk the following day, over very uneven country, brought them to Hachiôji, the road crossing a high chain of hills by the pass of Kobotoké. The mulberry-plants in this district attain a height of 10 or 12 feet, and were the finest met with.

This was their last stopping-place before reaching Yedo, and the remaining stage was performed next day in wheeled chairs.

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2. *Journey from Kijoto to Yedo by the Nakasendo Road.* By C. W. LAWRENCE, Esq., Second Secretary of Legation, Japan.

[ABSTRACT.]

THE Nakasendo, the road taken by the author on his trip to Yedo, is one of the great highways in Niphon, a considerable portion of it traversing the centre of the island in a westerly direction from the capital; another great road further south, the Tôkaido, follows the line of the sea-coast in the same direction, and the two unite a short distance to the east of the city of Kiôto, the author's starting-point. The distance from Kiôto to Yedo by the northern or Nakasendo road is 136 ri, or about 340 statute miles, while by the southern and more frequented road it is about 25 miles less; the former, however, possesses many advantages over the latter, both in scenery and objects of interest.

Leaving the fertile valley in which Kiôto is situated, on the afternoon of the 18th of June, Mr. Lawrence's route lay across the mountains intervening between the town and the lake of Biwa, on the shores of which a European house had been constructed by order of the Kiôto authorities, as an attraction to foreign visitors, the scenery in the neighbourhood of the lake being very fine; it derives its name from a resemblance it has in shape to a *biwa*, or native guitar. The nearest way to Kusatsu, where the two great roads diverge, is by crossing the lake, but the road by the southern end offers many attractions to the traveller.

From here the route ran some distance easterly, through a flat uninteresting country, until a steep range of hills was reached, crossing which another stretch of level country was passed, until the road strikes the valley of the Kisogawa, the largest river between Kiôto and Yedo; here high mountains covered with fine trees rose on either side of the valley. The Kisogawa flows into the sea

between Miya and Kuwana on the south coast, and is navigable 45 miles from its mouth.

They had now to cross some of the spurs thrown off from the Shinshu Mountains, or range running north and south across the greater part of Japan, and separating the provinces of Shinshiu and Echigo from those of Hida and Etchiu: the highest peak is said to be over 14,000 feet, and to exceed the height of Fuji-Yama. The range is crossed by the pass of Jikioku, the view from the summit is magnificent, which ever way the eye is directed.

Fuku-shima, a village near the pass, was in former days an important place, and used as a barrier to the province of Kiôto: it is now considered the best post-town on the Nakasendô; a road leads hence to the sacred mountain of Ontake San, 10 ri distant. Leaving the valley of the Kisogawa, the road, during the next stage, follows the steep ascent of Tori Toge, the summit of which is the highest point on the Nakasendô. The rivers here met with flowed towards the north-west coast; the scenery, however, was tame in comparison with the Kisogawa valley, but the villages presented a more prosperous appearance.

Crossing the head of the Tambagawa, the road runs north of the lake of Suwa, on the border of which is situated the castle-town of Takashima, where there is a celebrated shrine or *miya;* it is also famous for some hot-springs.

From the lake there is another ascent to the Kasatori-toge Pass, from the top of which a fine view is obtained of the Volcano of Asama-yama, the last great eruption of which occurred about 40 years ago. Oiwaki, the next town reached, stands on a low spur of the volcano; from here a branch road leads to the seaport of Nügata. Two stages more over a level plain brought them to the village of Karuizawa, at the base of the range of mountains opposite Asama-yama, crossing which they gradually descended to Takasaki, the largest town between Kiôto and Yedo on the Nakasendô, and situated in the centre of the silk district. The remaining portion of the road to the capital over the plain of Yedo was accomplished without incident, and possessed little of interest beyond what has been described by former travellers. The author interspersed the account of his journey with some of the numerous traditions with which Japanese history abounds.

This paper will be printed entire in the "Journal," Vol. xliii.

3. *A Trip in Mushashi, August, 1st–8th, 1872.* By F. R. M'CLATCHIE, Student Interpreter, Yedo.

[ABSTRACT.]

THIS was a short account of a trip into the fertile districts immediately north of Yedo, by way of the Nakasendô road, which runs in a north-west direction as far as Kiyôto. Descending the high ground which surrounds the city, in a sort of crescent-shaped ridge, the way lay across a fertile rice-plain many miles in extent, watered by streams flowing from the mountains of Koshiu on the north-west. The principal of these, the Todogawa, running through Yedo to the sea, was crossed by a ferry, at which point the river was 50 yards wide and navigable for large boats. The post-towns of Urawa and Omiya were next passed; to the east of the latter is a famous shrine dedicated to a deity, called Hikawa Jinja, situated in an enclosure of tall cedars and firs, approached by a broad and well-kept avenue.

A détour was here made from the main road to reach the commercial town of Kawagoyé, about 25½ English miles N.N.W. from Yedo, situated behind high ground rising from the midst of the plains; it is a busy prosperous town, visited by merchants from all parts of the surrounding country. Postal communication with Yedo was to have been opened the day following Mr. M'Clatchie's arrival. The citadel, lying to the south of the town is fast falling into decay; some repairs to the ditches were, however, being effected by convicts, having their heads shaved on one side. Cotton-cloth and linen appeared to be the chief articles of manufacture, and vegetables of all kinds were exposed for sale in the market. Turning to the east, the Todogawa was again crossed, and, although now narrowed to 25 yards, was navigable for good-sized boats and rafts; thence passing through country cultivated with beans, Indian-corn, and rice, to Iwatsuki, a clean, well-built town, with broad and well-kept streets; the citadel, at the north-east corner, was built some 300 years ago by Ota Dôkwan, lord of the province of Musashi, and renowned for his skill in military operations: the ditches are wide and deep, and full of water, and the walls loop-holed for musketry. A field-piece of foreign make, and some unmounted Japanese guns were also observed. At the north-west extremity of the town is a small elegantly-built temple, where in olden times the Daimios were accustomed to worship. Although a large city, Iwatsuki does not appear to be a centre of trade, which may be accounted for by its lying some distance from both the Nakasendô and Nikkôkaido roads. The route eastwards from Iwatsuki lay partly through a magnificent avenue of cedars, 15

miles in length; but to reach the castle-town of Seki-yado a cross-country path had to be taken.

Seki-yado is built on the right bank of the Tonegawa, at a point where the river bifurcates, the main stream flowing easterly to the Pacific, while a smaller branch runs southwards to the Bay of Yedo, the depth of water at the junction being 46 feet, and a large river-trade is carried on up to this point. The citadel, like that at Kawagoyé, was in a most dilapidated condition; although, from its proximity to the river, the moats were kept well filled. The return road to Yedo lay along the left bank of the Tonegawa as far as the city of Matsudu; large rice-plains bounding it for some distance on either side, excepting portions where the grey sand-silt from the overflow of the river had destroyed the productiveness of the soil, whilst here and there orchards of peach and plum-trees lined the road; patches of beans, Indian-corn, and tea, might also be seen.

From Matsudu a south-westerly direction was taken through the towns of Nuju-ku and Senji, till Yedo was again reached.

Sir HARRY PARKES said the papers which had been read furnished valuable itineraries concerning a considerable tract of country. One paper described a journey of 325 miles, another a journey of nearly 200 miles, and another a journey of 95 miles; and the section of country travelled through was one of the most interesting in Japan and the most important to our commercial intercourse with that country. Mr. Gubbins was by no means the first person who had ascended Fuji-Yama. The first foreigner who made the ascent was Sir Rutherford Alcock, and the first lady who ascended was Lady Parkes. Since Sir Rutherford Alcock visited the mountain of course others had profited by his experience, and there was considerably less difficulty in gaining access to the summit than in former years. It was a mountain of singular beauty, an extinct volcano; in shape a perfect cone, standing by itself, entirely disconnected with any range, and rising at once from the sea-level. It could be seen at sea, in fine weather, at a distance of 90 miles. It was the chief mountain to which pilgrimages were made by the Japanese. Ashima-Yama, an active volcano, was also in great repute for the same purpose. From its peculiar position Fuji-Yama felt the effects of the strong winds in a most remarkable way. Its isolation exposed it both to sun and wind, and the consequence was that it threw off its canopy of snow and put it on again with extraordinary rapidity. During the past year he had heard of four ascents being made. One on the 6th September, when there was no snow to be seen, or at most only small patches here and there, and another on the 27th of the same month, when the climbing party had to pass over four miles of snow, and suffered from snow blindness on their return. When he himself ascended it the temperature was exceedingly cold, probably as low as 10° or 11°, though he could not ascertain it exactly, his thermometer having been broken on the way up. This was on the 8th of October. Mr. Gubbins, however, found the temperature at the top not lower than 44°. In ascending Ashima-Yama he noticed that the mountain for about a mile from the top was covered with a layer of very fine sulphureous ash, about 16 or 18 inches deep, almost impassable, which had a very suffocating effect. When the rock beneath was struck it gave forth a hollow reverberating sound, just as would be heard on striking a large dome. The crater was nearly a mile in circumference, and by carefully leaning over at one point he was enabled

to look down till darkness hid the view. The sides were as smooth as if they had been polished with pumice-stone. Little jets of sulphurous smoke were continually bursting forth on all sides. Occasionally, when a large puff would come up, there was some danger, and the only way to avoid suffocation was to throw oneself down and so prevent it from getting into the throat. All the principal products at present derived from Japan were obtained from the district described in the papers—all the silk, and nearly all the tea. He trusted that ere long those mountains which were not in a volcanic state would be explored and made profitable by yielding supplies of minerals of various kinds. The introduction of railways, telegraphs, postal communications, mints, light-houses, &c., was a good earnest of the zeal with which the Japanese were addressing themselves to the work of progress, and it might be fairly expected that they would not now stand still. A noble career appeared to be opening to them. Situated as Japan was on the east of Asia, with a population of 32,000,000 or 33,000,000 of intelligent and advancing people, it was not too much to suppose she would exercise a very important influence in that part of the world, and that an example so well set would ultimately be followed by her neighbours.

Sir RUTHERFORD ALCOCK said that since he took charge of the first mission to Japan, twelve years ago, Japan had taken a leap from feudalism into modern civilisation and progress. She had cleared five centuries at a stride, and it was impossible not to feel an interest in such a people—a people so bold and gallant that they did not scruple to take a leap in the dark, for they could not have had the least idea of the result of such a bold step. They had a great many warm American friends, to whose counsel they paid great attention; but he hoped that they would not in all things act with the rashness which some Americans evinced, but would look steadily before them, and remember that things have to be developed and to grow at home as well as to be seized upon from abroad. With over 30,000,000 of an intelligent and brave race who were desirous of following the lead of Western nations, there must be a marvellous future before them. What Great Britain had been in the Western seas Japan might be in the Eastern seas. It was impossible for any one to look at the map and not be struck with the remarkable analogy between the little group of islands, called Great Britain, and that other little group of Japan. The Chinese naturally moved, as all bulky monsters did, at a slow pace; nevertheless progress was contagious, and the changes in Japan could not fail to have a certain moral influence on China. As proof of their progress the Japanese had now got a national debt; but it was very much to their credit that their first loan was to make their first railroad, and as that loan was now at a premium, it showed a confidence in them which might shame many countries of Europe.

Dr. LOCKHART said that on his first visit to the East he stopped at Batavia for some little time, and the only information he could obtain about the Japanese was from Dutch merchants who had resided for a while at Nagasaki, but the restrictions imposed on them prevented their acquiring much knowledge of the country or the people.* Some years after, a slight intercourse was opened by means of American whalers, and occasionally a rice-boat would drift across the Pacific to the west coast of America, the cargoes of rice sustaining the men, who otherwise must have perished. Several of these sailors were brought back to China, and Mr. Oliphant, a benevolent American merchant in China, fitted out a ship to take them to their homes. On the arrival of the vessel in Japan, Mr. Oliphant's representative was informed by the authorities that the returned sailors might land on the shore, but immediately they did so they would be beheaded. This being unsatisfactory, they returned to China, and were the means of enabling Gutzlaff and Williams to acquire a more intimate knowledge

* The works of Kæmpfer and Siebold had, however, done much to enlighten *Europe respecting Japan.*

of the Japanese language than they could otherwise have obtained. The first Japanese Dictionary or Vocabulary in the English language was compiled by Dr. Medhurst from Dutch sources, during the time he lived in Batavia. The next step in advance was made by Dr. Williams, formerly an American missionary and now the Secretary of Legation to the American Ambassador at Pekin, who studied the language with great assiduity. Some years afterwards, Lord Elgin's mission opened up Japan, and Sir Rutherford Alcock became our first minister there. Since that time progress had been most rapid, and the greatest mark of advancement was the adoption of a representative constitutional government instead of the feudal system which formerly prevailed.

SUZUKI KINZO (Japanese Secretary of Legation) thanked the meeting, on behalf of the Japanese Ambassador, for the kind reception which had been accorded to him.

The PRESIDENT asked the meeting to empower Sir Harry Parkes, who was just about to leave England for Japan, to convey their best thanks to the authors of the papers which had been read, and to Mr. Watson, who had sent them to the Society. He was sure that Sir Harry Parkes would remember the interests of the Royal Geographical Society, and do his best to put them in possession of such geographical information as he might obtain with regard to the interior of Japan.

Fifth Meeting, 27th January, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Munenori Terashima*, His Japanese Majesty's Envoy Extraordinary and Minister; *Suzuki Kinzo*, Secretary of Legation; *Alexander Mackenzie Cameron, Esq.; John Ewart, Esq.; George Lush Foss, Esq.; William Dawes Freshfield, Esq.; H. J. Gardiner, Esq.; R. T. Goldsworthy, Esq.; Dr. William Kane; George Law, Esq.; James Law, Esq.; Percival Lloyd, Esq.; James Tannock Mackelire. Esq.; Macrae Moir, Esq.*, M.A., Barrister-at-Law; *Major T. A. de Moleyns*, R.A.; *George Gordon Page, Esq.*, C.E.; *G. Phillips, Esq.*, Consul at Amoy; *William Brown Richardson, Esq.; C. Kimber Sharp, Esq.; James B. Taylor, Esq.; Lieutenant Charles Edward Howard Vincent*, 23rd Royal Welsh Fusiliers; *John Witford, Esq.*

PRESENTATIONS.—*Lieutenant-Colonel H. A. Addison*, Portuguese Vice-Consul; *Alfred A. Cresswell, Esq.; Griffiths Smith, Esq.*

ACCESSIONS TO THE LIBRARY FROM JANUARY 13TH TO JANUARY 27TH, 1873.—'Den Danske Gradmaaling.' Af C. G. Andræ. Kjobenhavn, 1873. Donors the Danish Government. 'Reisen in den Philippinen.' Von F. Jagor. Berlin, 1873. Donor the author. 'Predictions relating to America.' New York, 1872. Donor the author. 'Wirtembergisches Urkundenbuch in Stuttgart, 1849 to 1871.' In 3 vols. Donors the Society. 'Notes, &c., on the Gold Fields of

Quebec and Nova Scotia.' By A. R. C. Selwyn. Halifax, 1872. Donor the author. 'A Visit to Shamyl's Country in 1870.' By E. Ransom. 1873. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF JANUARY 13TH, 1873.—Sketch-map of the South-west part of the Coast of New Guinea, showing the tracks of Beccari and D'Albertis, April, 1872. Constructed and presented by Guido Cora, of Turin. Map of the Basin of the Rusizi, and north portion of Tanganyika, from the routes of Stanley, Burton, Speke, and Livingstone, &c. Constructed and presented by Guido Cora, of Turin. Map of Switzerland, showing meteorological observing stations. Presented by the Swiss Board of Works. Sketch-map of the Telegraph-line from Port Darwin to Adelaide. Presented by F. R. S. Dutton, Surveyor-General, Adelaide. Map of the World, showing the Submarine Cables already laid, and those projected. Presented by William Abbott, Esq., Stock Exchange, London. Map of Augusta County, Virginia. Prepared under the direction of Major Hotchkiss, Topographical Engineer of Washington College. 2 sheets. Presented by the author. Admiralty Charts on 35 sheets, bringing the Admiralty series up to the present date. Presented through Admiral G. H. Richards, C.B., Hydrographer.

The PRESIDENT said the subject of one of the papers to be read to the meeting was the province of Seistan, a country of considerable interest politically, ethnologically, and historically. It was a sort of debateable ground between Persia and Afghanistan, and was the native home of Persian romance, which in Persia occupied the place of historical associations. Any one who pretended to be conversant with Persian society must have at his fingers' ends the romance of the country, and Seistan was the land of Rústum and his associates, of whose life modern Persian conversation and manners were in reality a reflex. Sir F. Goldsmid had been sent out to Seistan in order to arbitrate between Persia and Afghanistan on the boundary question, and he had performed his difficult and dangerous task in a most satisfactory manner. He was accompanied by General Pollock, and assisted in his surveys by Major St. John, R.E., Major Lovett, R.E., and Mr. Blanford, all of whom were present at the meeting. He would now call upon Sir F. Goldsmid to communcate his own paper :—

1. *Journey from Bunder Abbass to Mash'had by Sistan, with some Account of the last-named Province.* By Major-General Sir F. J. GOLDSMID, K.C.S.I., C.B.

[ABSTRACT.]

SIR F. GOLDSMID and party landed at Bunder Abbass on the 21st December, 1871, with the intention of proceeding to Sistan, to carry into effect the Boundary Settlement with which he had been entrusted, and, having obtained horses, on the day before Christmas Eve they started for the interior.

Travelling in a north-easterly direction through a country very sparsely populated, they crossed a rocky range into the plains through which runs the river known as the Rud Khaneh-i-Duzdi, which here, flowing from west to east, turns south at Minab, thence finding its way to the sea. Camp was formed on its left bank, where they had expected to meet with a "Mishmandar" (or caterer), deputed by the Governor of Kirman to attend on them. He was reported, however, to be awaiting them at Khànn, a village some 30 or 40 miles distant, but did not appear until Doulat-abad was reached, having been two months away from Kirman in search of them.

From Doulat-abad, a long march of 30 miles was made into the mountains, the passage across which was effected by the Deh-Bakri Pass (7800 feet), previously crossed by Major Murdoch Smith, R.E., in 1860. A number of vexatious circumstances delayed the party a whole day when near the summit; but the passage was successfully accomplished on the next, and a forced march of 35 miles brought them to Bàm, where they were met by Major B. Lovett and Quartermaster Sergeant Bower, R.E., with one or two native attendants.

The people in the tracts passed through appeared to be a poor, inoffensive race, thoroughly under the control of their chiefs, some of whom evinced a decided partiality for intoxicating liquors. Sir F. Goldsmid was of opinion that any Persian-speaking Englishman, armed with a letter from the Governor of Kirman, or any high local authority, might travel in the fine Rudbar and Jinoft districts with safety, and even a certain degree of comfort.

After four days spent at Bàm (of which place the author had previously submitted an account to the Society), on the morning of January 12th, 1872, a march of 23 miles was made in a S.S.E. direction to the village of Kruk, approaching the line of mountains they had previously crossed, which has no generic name of its own, but is distinguished by the names of its prominent points.

At Azizabad, 17 miles E.N.E., four days were occupied in preparing for the march across the eastern portion of the Kirman Desert, the road still following the same direction, through the richly-cultivated and fertile plains of the Narmushir, to the comparatively populous town of Fahruj, on the Azizabad River.

From this place to Sekuha in Sistan is from 225 to 230 miles, in a general direction of north-east by east, across the desert. A halt of five days was made at Nusrutrabad, nearly midway, to await the arrival of a party of Sistan Beluchis sent to meet them. Pushing on from the last-mentioned place, a wild, mountainous region was entered, some of the peaks observed being of great height, and

capped with snow. The night was passed in a gorge of the mountains.

A march of 35 miles from this last camp brought them to the plains of Sistan, unmistakeably distinguished from the stony slope, by which it is reached from the south-west; and on February 1st, they entered Sekuha, the modern capital of Sistan, built amidst utter desolation and ruin, in a country so rugged and cut up as if it had been purposely rendered roadless and inapproachable.

It is somewhat embarrassing at the present day to define the limits of the province of Sistan. We may suppose two territories, one compact and concentrated, which may be termed "Sistan Proper," the other detached and irregular, which may be termed "Outer Sistan." Sistan Proper is wholly in possession of Persia, and is bounded on the north by the "Naizar," or reed-bed, which fringes the "Hámún" expanse; west by the "Hámún" itself; south by a line comprising Sekuha, and all villages and lands watered by the Sistan Canal; and east by the old bed of the Helmund, from the "Band" at Kohak to the mouth. The total area may be estimated at 947 square miles, with a mixed population of about 45,000; of whom 20,000 are Sistanis, 15,000 settlers from other parts of Persia, and the remainder Buluch nomads.

The soil is principally sand and clay alluvium, of proved fertility; but there are neither hills nor trees. It is well watered by rivers and canals: wheat or barley is, perhaps, the staple cultivation, but peas, beans, oil-seeds, and cotton, are also grown, and melons are abundant. Grazing and fodder were also met with.

The Hámún expanse, before alluded to as bounding the province on the west and north, is, for the most part, dry, and its existence as a lake can only be certified, at the present time, by the pools of water, formed in the early spring at the mouths of its principal feeders; yet its limits are well marked on the north and south: on the former by the "Naizar," and on the latter by a clay cliff of irregular height, called the Sangbar.

Sistan may be compared to Sind, in most of its features and characteristics, and, like it, is dependent upon canals, and occasional inundations, for water-supply; while well-defined beds of dry canals prove the pre-existence of an extensive water-system, similar to what may be observed in that part of India. The principal canal of Sistan, confounded by some writers with the parent river, carries the waters of the Helmund into the heart of the country, and is diverted from the river by a large "Band" or dam, protected from wilful damage by a fort and tower. By means of the main and branch

canals, water is conveyed to almost every town and village in Sistan Proper, thus offering facilities for an extensive grain-cultivation.

During the stay of the party, from the end of January to the middle of March, the thermometer ranged from 5° above zero, to a maximum of 93°, a low temperature prevailing, with strong continuous winds; but the season was an exceptionally severe one. Provisions were plentiful.

Of Outer Sistan, Chakansúr district forms the chief and most cultivated portion, and lies on the right bank of the Helmund, east of its embouchure in the Hámún, embracing an area of 120 miles in length, and some 30 in breadth. The portion south of this, or up the Helmund, is little cultivated, excepting along the river-bank; in addition there is another large tract on the opposite side of the river, extending from above the dam to the gravelly soil below the ranges dividing Sistan from Beluchistan, including an extent 40 miles north and south, and 90 east and west. The Outer Sistan population consists of Buluch Nomads, chiefly of the Sanjarani and Toki tribes. The fort in which the Sirdar resides, surrounded by about 150 houses, and bearing the name of Chakansúr, is the only place that may be designated a town, with the exception of Kaddeh on the eastern limit.

On the 11th of March, after a stay of some weeks in Sistan, a move was made towards Lash Juwain across the northern frontier, with a view of reaching Tehran viâ Mash'had, the capital of Khorasan. The district of Lash Juwain, or Kokat, has been already described by Femir and Conolly. It is of small extent, little populated, and sparsely cultivated. The fort of Lash stands on a perpendicular cliff 400 feet high, overlooking the Farah River. The road from Lash to Birjand, as far as the village of Durah, crosses a dreary undulating plain; further on, however, the country becomes more diversified, mountains and plains being met with at intervals, and much wild vegetation and cultivation where inhabited. The general direction of the hills appeared to be north-west and south-east, the valleys in many cases being shut in like an amphitheatre. During this portion of the route, Sardar Ahmed Khan, brother of the Governor of Juwain, took leave of the party. Sir F. Goldsmid spoke highly of his invariable courtesy and attention while in their company. He was a remarkably shrewd and intelligent man, and spoken of by Conolly and Khanikoff in equally favourable terms.

Birjand has been for many years the principal city of the "Kaianát," or divisions of the large Kaián district, superseding the original headquarters; the houses are of the ordinary Persian type, but a new bazaar of modern style is in course of construction.

On approaching the town the party were received by a cavalcade, headed by the youngest son of the Amir of Kaián, owing to the illness of his elder brother, who held the command during their father's absence at Sistan. A halt of three days was made here, to await a supply of camels. Kaián was reached on the 6th April, the intervening stages being Chink, Seh-Deh, and Rùm, neither of which had been previously visited by Europeans. The recent famine is said to have reduced their populations to less than half.

Chink, the first named of these, is by far the most picturesque; it is situated at the eastern extremity of a basin of high land, over which loom the crests of majestic mountains, in the tracts north of Birjand, where the altitude is not far short of 8000 feet above the sea-level: near it are many fruit-trees and gardens, while extending down the valley in narrow strips, or rather steps, are beds of green cultivation, and a stream of water running in a westerly direction down the valley. There were many such valleys near the encampment, the mountain tops clothed in reddish and greenish hues, the smoothness of their outline being relieved by massive boulders. At Seh-Deh were seen some beautiful specimens of the carpets for which the district is famous.

Kaián, the old capital, is built upon a plain almost surrounded by mountains; it covers a considerable extent of ground, and has large and numerous walled gardens. It is marked on modern maps as lying 60 miles south, instead of the same distance north of, Birjand. The population consists of some 500 families, chiefly Sâiads, Mullahs, and the like; they are bigoted and intolerant, acknowledging no resident temporal power out of their own community. This being their first acquaintance with Europeans, their inquisitiveness became rather troublesome.

The escort accompanying the travellers consisted of footmen only, collected together from stage to stage, and badly equipped,—no mounted escort being procurable either at Birjand or Kaián, on account of the scarcity of fodder for horses; and as the country to be traversed between the latter place and Bajistan was reported to be infested by Turcoman robbers, it became necessary to make some slight detour from the usual road, but although there were constant rumours of the approach of these unpleasant customers, the journey was accomplished unmolested. All the stages passed offered some attraction in points of scenery; the climate was almost perfect. The villages of Girimanj, Dasht-i-Biaz, and Kakhk are pleasantly situated; at the latter is the shrine of Sultan Muhamad, brother of Iman Raza, conspicuous by its dome with painted tiles of fanciful design, and evidently held in great esteem.

At the village of Zibad, the party were the cause of great alarm to the inhabitants, who mistook them for a party of marauders, and it was some time before confidence was restored.

A dreary march of 24 miles brought them to Bajistan, where a day's halt was made; a manufacture of silk and woollen cloth is carried on here, and the specimens seen were of a superior quality. Passing through the village of Iman Deh, on the road to Turbat, the next place of any importance, a letter was received from the Governor of Mash'had in reply to one sent by Sir F. Goldsmid, advising him of their intended visit. On nearing Turbat they were met by two parties of horsemen, one of them headed by the governor, orders having evidently been received to treat them with due honour. The town is most advantageously situated, and surrounded by gardens and cornfields, bearing testimony to the fertility of the soil; cotton and opium were also cultivated, but it had not escaped the blighting influences of the recent famine. The governor was a handsome, energetic man, and entertained the travellers with marked and unremitting attention; the remainder of the distance to Mash'-had, about 80 miles, was accomplished in three stages, by way of the Godar-i-Beidar Pass (2250 feet above Turbat); although this road had an unfavourable repute, owing to recent Turcoman raids, the presence of a strong escort rendered extra precaution unnecessary.

Mash'had is a city of special sanctity and repute, and is held in high veneration by the whole Muhamadan world, containing, as it does, the shrine of the Iman Raza. On reaching the high lands, whence a view of its minarets and golden dome is first obtained, it is the custom of orthodox Persian travellers to bow towards it reverentially, in acknowledgment of the holiness of the locality. The Arabic word Mash'had signifies a place of martyrdom in the cause of religion, and doubtless applies to the death of the Iman in prison by poison, yet it is greatly to be feared that, notwithstanding the odour of sanctity encircling the Mashadi, he had no higher morale than his coadjutors.

The city has been frequently described by previous writers, but although possessing many attractions, the enervating effects of its luxurious surroundings upon Europeans rendered a prolonged stay by a surveying party undesirable.

Among the many objects of interest met with, the most remarkable was considered to be the "Rig-i-Rowan," or moving sand, which tradition makes the resting-place of Iman Zard: it is situated at a hill between Kalek Kah and the Harut River, near the Perso-Afghan frontier, where deep drift-sand had become massed in a long

broad steep line from top to bottom of the southern face, the rest of the surface being quite clear, whilst a mysterious noise is produced by the shifting sand at uncertain periods. It is a place of pilgrimage for Muhamedans, who come to pay their devoirs at the supposed shrine.

The paper will be published entire, with a map, in the next volume of the 'Journal.'

The PRESIDENT said the route taken by Sir F. Goldsmid had never been followed by any European traveller since the days of Marco Polo. Only three Englishmen had visited Seistan previous to the late expedition. The first was Lieut. Conolly, the second Dr. Forbes, and the third was an officer sent there from Kandahar thirty years' ago. All these gentlemen died violent deaths during the Afghan war. The province of Seistan was so little known, and was of so much political interest at present as a debateable land between Persia and Afghanistan, that he would venture to supplement Sir F. Goldsmid's paper by a few notes on the ancient history and comparative geography of this part of the East.

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2. *Notes on Seistan.* By Major-General Sir H. C. RAWLINSON, K.C.B., President R.G.S.

This paper will be published in the 'Journal,' in connexion with the foregoing one by Sir F. Goldsmid.

Major ST. JOHN said he left Teheran, where he was acting as Director of the Persian Telegraph, for Bushire about the 20th October, 1871, and did not reach the latter place until the end of December. On the last day of 1871 he left Bushire by sea for Gwader, where he arrived seven days after; there he met with Mr. Blanford, who had been deputed to accompany him to investigate the geology and zoology of Beluchistan. They were detained at Gwader fourteen or fifteen days by orders from the Government of India, in consequence of the report of disturbances at Kej, where the Governor, appointed by the Khan of Kelat, had been driven away by the inhabitants. Their journey to Jalk, a place never before visited by a European, was uneventful, only diversified by continual quarrels with the camel-drivers, who persisted in attempting to follow the ordinary roads instead of that along the frontier. The country passed through consisted of narrow valleys running east and west, and separated by very arid ridges. About the middle of March they reached Jalk, in latitude 27° 36′ (45′ further south than laid down on maps), which was the limit of their journey north. It had been originally intended to join Sir F. Goldsmid in Seistan, marching across the desert, but the lateness of the season and the absolute refusal of the camel-drivers to accompany them, rendered this impossible. They therefore turned westward to Bampoor, across the mountains of Beluchistan. From thence they proceeded to Bam, from there to Kerman and Shiraz, and finally returned to Teheran in July. The country from Jalk to Bampoor was the most fertile and populous part of Central Beluchistan. The only European who had previously visited this district was Sir Henry Pottinger, who, in 1809, travelled through it disguised as an Indian horse-dealer, making his journeys principally by night, and going in continual fear

for his life. Mr. Blanford and himself, on the contrary, marched without an escort in broad daylight as comfortably and happily as possible, and he did not think they ran any greater risk than in a journey of similar length by railway in England. It was sometimes said that British influence had declined in the East, but that was certainly not true so far as Beluchistan was concerned. Early in April they reached Bampoor, where they stayed some days. From thence they went to Bam, quitting Beluchistan Proper about half-way between the two, and entering the province of Narmanshir. A few Beluch nomads were found further on, as far indeed as Kerman. It was remarked that none of the people occupying villages even in Beluchistan called themselves Beluches. Here for the first time they saw mountains of an altitude exceeding 8000 feet above the sea; and as the old maps represented the country as a vast plain, they were astonished to find mountains 15,000 feet in height, a continuation of the long chain which commenced in latitude 34° N., and almost divided Persia in two equal parts. South of Bam it was found to terminate in an irregular mass of volcanic hills, the two principal peaks of which had previously been delineated on maps as one, the Koh-i-Naushadūr. Probably this volcanic range was also continuous to the north, and formed the western boundary of Seistan. After leaving Bam a great change of climate was experienced, as they passed from the almost tropical temperature of the low plains to a place called Regan, 8000 feet above the sea, where they had a second winter. From Regan they descended the hills to Kerman, where they were detained a fortnight for want of means of transport. On nearing Shiraz they found a greener and a more pleasant country. The whole journey from Teheran and back comprised a distance of about 2600 miles.

Mr. BLANFORD said that since his return he had been surprised to find that the portion of Persia and Beluchistan through which he had travelled was almost unknown, so far as its geology and its fauna were concerned. The general physical geography of Persia, even, was but imperfectly represented on existing maps. The country might be described as a great central plateau, separated from the sea and from Central Asia by more or less well-defined ranges of mountains. This plateau varied from 1500 to 3000 feet in elevation, and the larger portion consisted of deserts, of which a great part was very nearly level. The old traditions in the country lying to the south of Mash'had might have had their origin in the existence of seas in that part within the memory of man, or might have been caused by the general flat appearance of the country, but he was strongly disposed to believe that these central plains were once covered with water, and that the Caspian of the present day represented the condition in former times of a portion of the interior of Persia. This view was confirmed by the fact that along the coasts there were certain well-marked evidences of a comparatively recent rise in the land. The ranges in Beluchistan and South-Eastern Persia had a tendency to an east and west direction, due almost entirely to the peculiar strike of the rocks, which consisted of tertiary beds turned up on end, thus contrasting strongly with beds of about the same age on the frontier of Sind. These rocks did not reach the sea at any place to the west of Gwader until far within the entrance to the Persian Gulf, for along the sea-coast were a number of beds of comparatively recent age, containing shells identical with those now existing in the neighbouring seas, and evidently dating from recent tertiary times. Beyond these comparatively recent beds there were, in the neighbourhood of Shiraz, beds of nummulitic limestone, and the great ranges, traversed by him during his journey from Bampoor to Ispahan, were composed partly of limestone, which he believed to be cretaceous, partly of volcanic rocks, and partly of granitic rocks. The great range to the south-west of Bam was composed chiefly of granitic rocks, while the high mountains in the neighbourhood of Rayin were volcanic, and the ranges between Shiraz and Ispahan partly rocks which he believed to be cretaceous and partly volcanic formations. The mountains

in the north of Persia were composed of rocks differing from those found further south, and were interesting from the existence of coal. The rumours of the existence of coal in the Persian Gulf appeared to have been based on imperfect evidence. The Seistan Lake was an extraordinary phenomenon, from the fact that, though a large river ran into it, it had no outlet, and the water was perfectly fresh. The great deserts of Persia contained marshes in several places, but they were generally salt. He therefore concluded that there were some means of escape for the water of the Seistan Lake beneath the sand. The fauna of Persia was very interesting, because some of the great zoological provinces into which the world was divided met there. These provinces were the Palæarctic or the fauna covering Europe, Africa north of the Atlas, all northern Asia, and a portion of North America; the Ethiopian of Southern and Central Africa; and the so-called Indian or Indo-Malay fauna of South-eastern Asia. Besides these there were one or two minor provinces which were well worthy of attention, such as the Indian and the Desert fauna. The Desert fauna was a modified form of the African fauna. The Indian fauna was that of British India, properly speaking, and showed a great many peculiarities; one of the most singular being the occurrence of such forms as the nilgai and the Indian antelope, which had distinctly African affinities. In Persia the Palæarctic fauna appeared to be confined to the neighbourhood of the Caspian. The fauna of Central Persia was a modified form of Desert fauna, typified by gazelles, wild asses, peculiar forms of finches and larks, mixed with a considerable number of Palæarctic forms, such as crows and magpies. The fauna of Southern Persia and Beluchistan, the low country below the ranges which separated the plateau from the seaboard, consisted of the same desert fauna, but mixed with Indian forms, such as the grey partridge of India, a peculiar sunbird, and some others. One great point of interest was that Persia appeared to be the limit to which a large number of common European animals extended. The results of their journey were not, however, yet worked out.

In replying to questions, Major ST. JOHN said it would be quite impossible to run a railway along the Persian Gulf. The general level of the valleys in the interior of Persia proper was about 5000 feet. Snow fell all over Persia in winter, except on the sea-coast. The Kej Valley was about 600 or 800 feet in elevation. Major St. John described on the map the peculiarities of the valleys between the mountains. The highest elevation, he said, between Shiraz and Ispahan was about 8000 feet. The difficulties between Bushire and Bunder Abbas were not insurmountable, but exceedingly great; but beyond Bunder Abbas the country was so desolate that every navvy sent out to Beluchistan would have to be supplied with water from ships or by artificial means. It was the most frightful desert that could possibly be imagined. At Cape Muari there would have to be a tunnel many miles in length, through a cliff there running out into the sea. Besides this, the climate was such that no travellers would care to go through the country by rail. Seistan, though perhaps better than the coast of Beluchistan, was not a nice country; the mosquitos popularly described as being as large as sparrows, and the climate so unhealthy the greater part of the year that horses could not live there. The difficulties of interior Beluchistan were not very great; but the water supply was limited, and all provisions and labour would have to be obtained elsewhere. The inhabitants were refugees from all neighbouring countries, and Beluchistan might be described as the Alsatia of western Asia. In fact, it was the most villanous country that could possibly be imagined.

Mr. D. SEYMOUR asked if Sir F. Goldsmid could state whether the late famine in Persia had done permanent injury to the country, and whether the loss of life had been very terrible? Was there any sympathy on the part *of the inhabitants* for either Afghanistan or Persia?

Sir F. GOLDSMID said, that although he had passed through the famine-stricken parts of Persia after the calamity had reached its height, he saw enough to convince him of its serious nature. As to the second question, in the fertile part of Seistan, the delta of the Helmund, the people, being a Persian-speaking race, probably sympathised more with Persia than with Afghanistan; but further up the river the sympathies of the population would rather be with the Afghans. In the small portion of the debateable land which he awarded to Persia the feelings of the people were favourable to that country.

Major CHAMPAIN said, though he was absent from Persia during the severity of the famine, he had been in constant communication with Captain Pierson and other officers of the Telegraph Department, and he knew from them that it would be impossible to exaggerate the misery that had spread all over the country, more especially in the south towards Shiraz and in the east towards Khorassan. About seven months ago, when the famine was nearly over, he returned to Persia, and heard from villagers, who did not know that he had any interest in the question, well authenticated stories of mothers having eaten their own children; and he had not the slightest doubt that such things did occur, although the Persians tried to hush them up. When Captain Pierson marched up from Shiraz about a year ago, he, in many instances, had to remove dead bodies in threes and fours out of the caravanserais where he intended to lodge for the night. He himself had seen more than one dead body lying on the road. At present the famine was completely over. Owing to the abundant snow last year there was plenty of food, but the mortality among the mules and camels had been so great that it was almost impossible to transport sufficient provisions to the large cities, and consequently much want prevailed in those places. The people were dying in great numbers from fever, for their bodies were so emaciated and enfeebled that they could not hold out against the sickness. He believed that from 200,000 to 300,000 persons had fallen victims to the famine.

The PRESIDENT said Major Champain had given a most deplorable account of the disasters which had befallen Persia, but a brighter future seemed in store for the country. He was happy to see present Baron Reuter, who was prepared to enter into very large undertakings with a view to the improvement of Persia. He should be glad, at some future meeting, to have a discussion on the great subject of a through railway to India *viâ* Persia. He would draw the attention of the members to a sketch suspended before them of a tower which had been found at Nadali. The tower probably dated from the Seljukian period. Its architecture was similar to that of other Seljukian monuments in Persia. He was unable to say for certain what city Nadali represented. Most likely it was Qarnein, which was the birthplace of the four famous brothers who founded the Sassanian dynasty which ruled over the whole of Persia some 150 or 200 years. The intercourse between Persia and England was becoming more and more intimate. The Shah of Persia himself was expected to arrive in this country in a few months, and he (the President) hoped to see him one day at a meeting of the Geographical Society, when perhaps the subject of a through railroad might be discussed.

Sixth Meeting, 10th February, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*F. Hirth, Esq.*, PH. DR.; *Robert Emmott Large, Esq.; William John Mantle, Esq.; James Mudie Spence, Esq.*

PRESENTATIONS.—*J. H. Buxton, Esq.; T. B. Christie, Esq.*, M.D.; *H. J. Gardiner, Esq.; Captain Campbell Walker.*

ACCESSIONS TO THE LIBRARY FROM JANUARY 27TH TO FEBRUARY 10TH, 1873.—'The Imperial Gazetteer' (Supplement). By W. G. Blackie. 1873. Two vols. Donor W. G. Blackie. 'Diario di un Viaggio in Arabia Petræa, 1865.' 'Atlante per Servire al Diario, etc.' By Visconti Arconati. Torino, 1872. Donor the author. 'Observations on the Coasts of Van Diemen's Land, &c.' By M. Flinders. 1801. Presented. 'Allgemeine Orographie.' Von Carl Sonklar. Wien, 1873. Donor the author. 'Voyage d'Exploration en Indo-Chine, 1866, 1868.' Par Francis Garnier. Two vols. and Atlas. Paris, 1873. Donor the Ministre de la Marine. 'The Red River Expedition.' By G. L. Huyshe. 1871. Purchased. 'Rambles of a Naturalist on the Shores, &c., of the China Seas.' By C. Collingwood. 1868. Purchased. 'Varieties of Vice-Regal Life.' By Sir William Denison. Two vols. 1870. Purchased. 'Despatches addressed by Dr. Livingstone to H.M.'s Secretary for Foreign Affairs.' (Parliamentary Paper, 1870, 1872.) 'Observations on the Meteoric Shower of November 27th, 1872.' By J. P. Joule. Donor the author. 'Annaes Maritimos e Coloniaes.' Lisboã, 1844, etc. Donor the Visconde Duprat.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF JANUARY 27TH, 1873.—A Map of San Juan or Haro Archipelago, showing the boundary channel between British America and the United States. A Map of western part of Mongolia, showing the routes of the Russian travellers Matusowski and Pawlinow in 1870. A Map of part of the North Coast of Siberia, showing the mouths of the Rivers Lena and Yenisei. Presented by Dr. A. Petermann. A Planisphere of the Stars; constructed by General Harness, R.E., C.B. Presented by Col. T. B. Collinson, R.E. A Bust of the late Captain J. H. Speke. Presented by J. Wilson Holme, M.A., F.S.A., F.S.G.S. An Atlas, containing Charts of the River Amazon, from the frontiers of Peru to the mouth of the Amazon. Presented by J. Beaton, Esq. A Russian Map of the south part of European Russia, near the Sea of Azov, showing the Coal Formations and Geology of the Donetz Basin. Map of the Island of Formosa and the Pescadores. By General C. *W. Le Gendre, U.S.* Consul, Formosa. Presented by J. Thomson, Esq.

The following Paper was read:—

On Discoveries east of Spitzbergen, and Attempts to reach the Pole on the Spitzbergen Meridians. By CLEMENTS R. MARKHAM, Esq., C.B.

[ABSTRACT.]

IN adverting to the subject of Arctic exploration to be undertaken by Her Majesty's Government at probably some not very remote period, Mr. Markham agreed with most naval Arctic authorities in the advantages to be gained by following a route up Smith Sound, as offering a wider field for investigation, and securing an open passage for retreat. But the object of his present paper was to show what had been accomplished in other directions towards reaching high latitudes, more especially, of late years, by way of Spitzbergen, the western shores of which nearly three centuries of Arctic experience had rendered us tolerably familiar with. The eastern coast is as yet almost unknown, a combination of natural causes having rendered nugatory all attempts to penetrate its icy barrier. The Polar stream, flowing from east to west along the coast of Siberia, collected on its way large quantities of driftwood from the mouths of the Asiatic rivers, then rounding the northern end of Novaya Zemlya, brought Polar ice and accompanying *débris* upon the north-eastern and eastern shores of Spitzbergen and its outlying islands; the same current also carried the ice along the east coast of Greenland to its extreme southern point of Cape Farewell. To explain fully the effect of the warm Atlantic current upon the western coast of Spitzbergen, it will be necessary to quote the author's own words:—"The warm current from the Atlantic, forks, off the south end of Spitzbergen, and keeps it comparatively free from ice, although the ice streaming out of the Spitzbergen fijords edges it off to some distance from the land. Meeting the Polar current, its greater specific gravity, caused by its containing more salt than the Polar water, makes it plunge into the depths and for a time become a submarine current flowing in a direction contrary to that of the Polar one. Salt water weighs 28 per cent. more than distilled water, and the Gulf Stream contains 35 thousandths of salt to 33 thousandths in the Polar current. Moreover bodies of water in rapid motion do not readily interchange their temperatures, so that a warm stream might flow beneath a cold stratum for a considerable distance without mixing. Thus, when Mr. Leigh Smith obtained some sea temperatures at various depths, off the north-west point of Spitzbergen, while the water on the surface was only a degree or two above freezing, the temperature at 500 fathoms was 52°, and once even 64° Fahrenheit. Scoresby also suggests that the warm stratum is an extension of the Gulf

Stream, which, on meeting with water near the ice lighter than itself, sinks below the surface and becomes for a time a counter under-current. The branch of the Gulf Stream, which thus becomes a submarine current, slowly and gradually mixes its waters with the Polar stream, as it loses its velocity owing to the tendency of the warm water to rise, and eventually becomes a part of it. So Forchhammer has ascertained that the cold current flowing down the east coast of Greenland, from the north, contains Atlantic water. These oceanic movements account for the ease with which western and northern Spitzbergen have been explored, while the eastern side retains many of its secrets, and invites the explorer."

Returning to the subject of what had been already done in this region, Mr. Markham awarded the original discovery of these islands to the Dutch navigator, William Barents, in 1596, although it has also been claimed for the unfortunate Sir Hugh Willoughby nearly half a century earlier. Disputes have arisen concerning Barents' knowledge of the eastern coast; but on a map specially prepared to illustrate his work, the 'Admiranda Navigatio,' published in 1611, portions of the northern and western shores only are shown, including the track of Barents, who first sighted the land on June 19th, 1596, in lat. 79° 49′ N., near the extreme northern end of the west coast. He named his new discovery Greenland, but in a tract published in 1613, by Hessel Gerard, the land was called Spitzbergen, which name it has since retained. Barents spent the winter following his great discovery, in Novaya Zemlya, where in 1871 Capt. Carlsen found a quantity of relics, consisting of books, arms, instruments, &c., left behind by the party, and which had remained undisturbed for three centuries. They are now deposited at the Hague, and form an interesting memento of the gallant adventurer and his companions. (An illustration of them, enlarged from a photograph, was exhibited at the meeting.)

The north and west coasts were next visited by Henry Hudson in 1607. He did not, however, push his explorations further, or add anything to the information obtained by his predecessor; but from that time to 1622 the whaling ventures in those seas, prosecuted under the auspices of the Muscovy Company, led to the discovery of Hope and other islands to the south-east. Captain Thomas Edge, who took a prominent part in these expeditions, was the first who made any important additions to the work of Barents. In 1616 he sent a pinnace of 20 tons to the eastward to explore the land seen in that direction: the venture was a most fortunate one, the crew succeeded in killing 1000 sea-horses on Edge Island, and penetrated up the Stor Fijord, which separates it from Barents' Spitz-

bergen, as far north as 78°, and in the following year, 1617, reached to 79°, and sighted land still further to the east, called by him Wiche's Land, all of which are clearly shown on an old chart of Spitzbergen in Purchas's 'Pilgrims.' The last-mentioned land has been re-named by modern explorers King Karl Land; but there can be little doubt of its identity with the discovery of Captain Edge.

During the years previously mentioned, while the English mariners were in the ascendant in those seas, they did excellent geographical work, as may be seen on the chart of Purchas. The whole of the west and northern coasts of Spitzbergen, with their fijords and islets, are there delineated and named, together with part of the strait between the main island and North-East Land, called Sir Thomas Smyth Inlet, afterwards named the Waaygat or Hinlopen Strait. There also appears North-East Land, called Sir Thomas Smyth Island; the whole of what is now called Stor Fiord by the Swedes; with the west and south coasts of Edge Island, and Alderman Freeman's Inlet on its northern shore; and still further east, we have Wiche's Land, discovered by the English in 1617, but never again shown on any map until 1870. Most of the nomenclature above mentioned was afterwards altered by the Dutch; but Mr. Markham expressed a hope that, in all new maps, the old names would be restored, so as to identify them with the original discoverers.

Subsequent to 1622 the Dutch gained the supremacy in these waters, but made no material addition to our knowledge of the group until 1707, when Captains Outger Reps and Cornelis Giles made voyages to the eastward, such as have never been equalled up to the present day. Captain Giles passed more than a degree to the north of the Seven Islands without hindrance from ice, next sailed east for some leagues, then south-east, and afterwards south. In lat. 80° N., he saw very high land, about 25 miles in a direction east from North-East Land, which has since been known as Giles or Gilles Land. From his point of observation he steered a course southwards along the eastern shore of North-East Land, and, entering Hinlopen Strait, anchored in Lomme Bay; thus the Dutch ascertained that the two inlets, discovered and named by the English after Sir Thomas Smyth and Alderman Freeman, were in reality straits and re-named them respectively Hinlopen and Walter Tymen. They also discovered the Seven Islands, the east coast of North-East Land, Giles Land, and three islands off the east coast of Edge Island, which they named Ryk Ises; but never saw the Wiche Land of the English, further east.

All the information obtained by the Dutch is embodied in a

chart published by the Van Keulens, the last edition of which was published in 1728. (A copy was exhibited at the meeting.) The accuracy of Van Keulens' chart was fully appreciated by Mr. Foster, one of the lieutenants accompanying Parry's expedition. The whaling trade of the Hollanders gradually came to an end in the latter part of the last century, and Mr. Markham thought it was greatly to be deplored that at present they had no representative among the many gallant bands of all nationalities who were endeavouring to lay open the vast unknown area surrounding the Pole.

Although the names of Scoresby, Tchichatcheff, Phipps, Buchan, Clavering, Parry, and others, are familiar to us in connection with Spitzbergen, they limited their operations to the comparatively well-known western and northern shores. All the knowledge that had since been acquired of the land to the eastward is due to the Swedish and German expeditions; to the enterprise of some English yachtsmen; and to the captains of Norwegian sealers, who have been induced by Professor Mohn, of Christiania, to take observations and furnish him with notes of the results of their voyages. Mr. Lamont in 1861, and Mr. Birkbeck and Professor Newton in 1864, attempted an examination of the eastern coasts, but failed to penetrate further north than the Ryk Ises Islands, where they were stopped by the ice.

The five Swedish expeditions of 1858-61-64-68 and 72, under Captain Nordenskiold, contributed some valuable observations and information; they were confined chiefly to the south-west and north-west, yet they pushed further east along the north coast than either Phipps or Parry, and rounded Cape Platen to the east of the Seven Islands; they also penetrated down Hinlopen Strait almost to its south-eastern outlet, and saw land believed to be the Giles Land of Van Keulen's chart. Captain Koldewey, in charge of the German expedition, also sailed down Hinlopen Strait.

In 1870 Baron von Heuglin examined both shores of the Stor Fiord as far as Heley's Sound; he also sailed up Alderman Freeman Strait (or Walter Tymen of the Dutch) until he reached and rounded the north-eastern extremity of Edge Island; from here he sighted extensive land on the eastern horizon, undoubtedly the Wiche's Land discovered by the English in 1607, and seen by Mr. Birkbeck in 1864.

It is to Professor Mohn and the Norwegian sealing captains that we are indebted for the greater portion of what lies to the east. The passages running east along the northern and southern shores of North-East Land, and known as the Northern and Southern Gates, are usually blocked with ice. Captain Carlsen, in 1863, was the first

to try the northern passage, but without result. In August, 1864, Captains Tobiesen, Aarström, and Mathilas made the attempt with more success, and rounded the extreme north-east point of North-East Land; on the 7th, when about 12 miles N. by W. of that point, they sighted land bearing S.E. by S. (either Giles or King Charles Land). The drift-ice, which meanwhile had come down in large quantities from the north, precluded all hope of returning by the way they came; they therefore decided on endeavouring to force a passage southwards along the east coast towards the Southern Gate, but were compelled to abandon their vessels, with valuable cargoes of seals and walruses, and take to the boats; and after drifting through the Southern Gate, up Hinlopen Strait, and along the northern and western shores of Spitzbergen, were finally picked up in Ice Fiord, having been carried 700 miles.

Within the past year the western shore of Wiche's Land, discovered in 1617, has been visited on three occasions; by Captain Altmann in July, Captain Johnsen in August, and Captain Nilsen later in the same year. It was described by Captain Johnsen as about 44 miles long, its south-eastern shore being covered with enormous quantities of driftwood.

The most interesting of all recent voyages were those which had been undertaken by Mr. Leigh Smith, with the twofold object of attaining very high latitudes, and of exploring the unknown region east of Spitzbergen. In 1871, in company with Captain Ulve, he sailed down Hinlopen Strait, and reached a position at its south-eastern outlet, where Koldewey had been in 1868. From this point he could see the land on the opposite shore stretching far away a little N. of E., prolonging considerably the southern coast of North-East Land; the sea in that direction being, as usual, blockaded with ice. Mr. Smith returned north by Hinlopen Strait, and tried a passage east by the Northern Gate, and rounding Cape Platen, forced a way 40 miles east, from which point he could discern the land still trending in that direction, and he named the furthest headland Cape Smith. Mr. Smith's observations have thus considerably altered the shape and enlarged the area of North-East Land. A second expedition undertaken by the same gentleman in the following year proved unproductive of result, owing to the unfavourableness of the season. It was his intention to make a third attempt in the spring of the present year, in a steamer specially adapted for the purpose, and it was to be hoped that, under favourable circumstances, he would be enabled to proceed still further eastward, and complete the discovery of Giles Land, and, if possible, reach a very high latitude.

For the reasons mentioned in the early part of his Paper, by which the highest latitudes had been attained by sailing up the west side of Spitzbergen, Mr. Markham was of opinion that the month of May offered the greatest prospect of success, and alluded to the manner in which the Scoresbys, in 1806, pressed through what appeared to be impenetrable ice as far as the eye could see, discovering open water in 80° N., or 4° from where they first entered the pack, and sailing north to 81° 30′, before being checked by the main body of ice, with open sea extending in an E.N.E. direction. The Swedish expedition of 1868 attained a latitude of 81° 42′ N., while in 1871, Mr. Leigh Smith reached 81° 24′, both almost on the same meridian, about 18° E., or a degree west of Scoresby's furthest. A number of fabulous stories had been circulated concerning vessels which had sailed to still higher latitudes, but the evidence on which the majority were based was scarcely worthy of credit; a list of them had been published in a report recently issued by the Society.

In conclusion, Mr. Markham proceeded to analyse the arguments that had been advanced by different authorities as to the existence of an open Polar basin; he was opposed to speculation, as being unprofitable, he did not hold with the theory that the Gulf Stream, after passing beneath many hundreds of miles of a cold superstratum of water, reached the surface near the Pole at a sufficiently high temperature to melt the ice far and wide. Another argument, equally specious, had been advanced regarding the fact that the sun, with greater power than it has at the equator, pours its rays on the North Pole for six months without intermission; but Scoresby pointed out half a century ago that in Spitzbergen, where the sun also has more power than at the equator, and shines for four months unceasingly, the average temperature was only 17° Fahr.; but the same rule might apply in other instances, such as the sun being more powerful at Edinburgh than at the Mauritius. The dryness of the Polar atmosphere was equally the cause of the heating power of the sun's rays, by reason of the more rapid terrestrial radiation of the excessive cold. Another theory, and apparently a more plausible one, had been suggested, viz., that the enormous fields and floes of ice which drifted south during summer, must leave a wide space of open sea round the Pole; and it was urged in evidence that, in the Antartic regions, Sir James Ross pushed through 800 miles of pack-ice, and reached open water to the south of it, being the space whence it had drifted; but Admiral Collinson, in 1865, had shown that the Antarctic pack was simply drifting away from a solid line of immovable ice-cliff, and left open water

in its rear, because there was no moving ice further south to take its place; this proved the reasoning to be fallacious. The case of Scoresby in the north, already alluded to, was exactly analogous to that of Sir James Ross in the south.

He based his own reasons for disbelieving in an open Polar sea on the fact that all evidence was against the existence of any great extent of land, or grounded ice-barrier, at the Pole; if any were found, it would be in islands at the extreme north point of Kennedy Channel, and he was therefore in favour of a Smith Sound route being selected for a Government Arctic expedition. The North Polar pack drifting south between Spitzbergen and Greenland, at a maximum rate of 8 or 10 miles per diem, if there was no extensive land to the north, of course, reached beyond the Pole to as far as ice was formed on the other side in 74° or 75°. The open sea left by its drift would not be at the Pole, but on the coasts of Wrangell Land and Siberia, where the drift commenced.

Doubtless there was great expansion of the ice in summer, causing open lanes and pools, and open seas would be created by winds and currents throughout the year; but from those considerations, he submitted that the idea of a permanent open sea round the Pole must be purely chimerical; nevertheless, an examination of the seas north and east of Spitzbergen would unquestionably yield much interesting information (if advantage were taken of a favourable condition of the ice) with regard to currents, sea-temperature, and meteorology, and offered a wide field for private enterprise; but he felt that a Government expedition should proceed by way of Smith Sound, that being the direction by which the most extensive geographical discoveries and scientific results, as well as the highest northern latitude, could be attained.

The Paper will be published entire in 'Journal,' Vol. xliii.

The PRESIDENT said no doubt could be entertained by any one as to the great interest and value of the geographical facts which had been collected by Mr. Markham, and so clearly placed before them. But his opinion on questions of physical geography, as well as on the best method of renewed Polar exploration, although entitled to the greatest consideration as an experienced authority on the subject, might still be open to criticism, and it was with the view of eliciting the opinions of the Arctic authorities present that he would now invite a discussion on the subject.

Captain SHERARD OSBORN, C.B., said his reading and notes upon Spitzbergen led him to the same conclusions as Mr. Markham, that the first discoverer was Barents, and not Willoughby, the Englishman. But, Barents having made the discovery in 1596, it was very remarkable how quickly the Englishmen of that day followed on his heels, and opened up the field of fishing in that direction. As early as 1610 the major portion of the Muscovy Company's energies were devoted to the fishing of the whole of that coast. It was equally certain that Captain Edge, one of their captains, when in latitude 79°

saw land to the eastward, which Purchas subsequently called Wiche's Land. It was rather a curious fact that 250 years afterwards a German traveller, from nearly the same position, saw identically the same land. But the old English sailor's discovery was utterly forgotten, and this was handed over as a discovery to a German potentate. It was the duty of every explorer to protest against the misappropriation of other men's discoveries; and he should himself have written to Dr. Petermann on the subject, but for Mr. Markham's assurance that that gentleman in his future charts intended to be most particular in preserving the names of the points, headlands, and bays discovered by those old sailors two centuries and a half ago. The land called Wiche's Land had recently been sailed round by Norwegians. But the recent voyage of Lieut. Payer pointed to the existence of land still further eastward towards Nova Zembla. A fact in favour of that supposition was, that navigators found the ice hanging against the east coast of Spitzbergen, whatever might be the direction of the winds. Now, if there was plenty of room and no land to the eastward, the ice, with westerly winds, would drift away to the eastward, just as it actually set away with easterly winds to the westward. Our intercourse with Spitzbergen was continuous after its first discovery, excepting during the reign of the Stuarts and the time of the Commonwealth, when home troubles were so great that foreign fisheries were neglected. The first men that wintered in the Arctic circle were seven English sailors, belonging to the Muscovy Company. They were away sealing, and a gale of wind coming on, the captain, who had a full ship, left them behind. An account of these men's sufferings was to be found in a very curious pamphlet published for the Hakluyt Society, in 1631, by John Partridge, in Paternoster Row, at the sign of the *Sun*; which narrative, on some future evening, they would be able more fully to discuss. He could not help thinking that they were in rather too great a hurry to establish theories as to the existence of land or water at the Pole. They had better leave the question an open one until some one reached the Polar area, and told them what it really was.

Mr. J. LAMONT said that in the course of his four expeditions to Spitzbergen he had always found the south-east part of the coast perfectly impassable by reason of the heavy drift ice. It was only on extremely rare occasions, such as last year, that any one had been able to make a way there. On a voyage from Nova Zembla to Spitzbergen, although he found a great deal of heavy ice to the north, there were indications of land, such as a number of birds, apparently shallower water, and drift wood; but of course the existence of land there was still an open question.

The PRESIDENT: Have you seen Giles Land?

Mr. LAMONT: No. I have been where I ought to have seen it had the weather been clear enough.

Captain WELLS, R.N., said that it was his good fortune to fall in with Nordenskiold on the coast of Spitzbergen, and the result of his interview was his firm conviction that it would only be an Englishman who would ever succeed in reaching the Pole. He said that, not with the view of making any undue comparison with foreign nations, but looking to the appliances which Englishmen had at their command. It was not too much to say that the attempts made by explorers to reach the Pole from Spitzbergen must fully convince the inquiring public that that route was a possible one. The ill-found sailing or other craft employed by those explorers who had gone out and returned home without injury or detriment to themselves or their craft, must fully prove, if proof were wanting, that a well-found whaling vessel, such as England alone had at her command, was all that they wanted when at the north of Spitzbergen to enable them to attain the twofold object of reaching the Pole and exploring that Polar basin which had been questioned in the paper. Only the previous morning he had received *a letter from a most distinguished* whaling captain, who intended this year to

press through that ice, and get to the region beyond, where he expected to find whales and other arctic animals in great quantities. With regard to the warm-water question referred to by Mr. Markham, and the remarks of Captain Osborn that the ice accumulated on the east coast of Spitzbergen, and that with a westerly wind it probably might drive to the eastward, many scientific men asserted that the motion of the earth caused the ice to drift to the west in its course to the south, and he could bring forward a most decided proof of that theory. If the ice drifted southwards only, it would bring it to the east of Iceland: whereas, the fact was, that the ice came between Iceland and Greenland, and there escaped. He (Captain Wells) fell in with the ice off Jan Mayen, and went along by its edge, going into the open water, wherever it occurred, in search of seals and other game. The ice coming from the Pole by that way was flat, and covered with opaque snow of great thickness, so that the ice of one year's formation could not melt on the surface, but from underneath. That fact went a long way to prove the assertion that the warm water from beneath thawed the ice. Admiral Collinson made a voyage from Behring Straits, and came along the north coast of America, where it was marked "Packed Ice" on the chart, making a longer voyage than had been previously made by any other sailing vessel. The reason of his success he believed to be this, that the shore being a very shallow one, the ice of *more* than one year's formation grounded, leaving ice of only one year's formation, which, on melting, left the passage open for him. He should like to know if any one could possibly account for this ice melting by the supposed action of the Gulf Stream in that neighbourhood. Then, again, Morton found warm water, Scoresby found warm water, and he (Captain Wells) found warm water; and perhaps Admiral Collinson could account for the fact of the ice that was covered with opaque snow melting from underneath, bearing in mind that the water from the rivers is ice-cold, and of less specific gravity, necessarily floating on the surface of salt water.

Admiral COLLINSON said he should be inclined to contend that the "packed ice" shewn upon the chart extended all over the Polar region, and his impression was that there was no getting into it. He would explain why he arrived at that conclusion. If they looked at the shape of that peculiar mass of ice they would see how, if it was moved a little, it would exactly fit into the bays and headlands between Icy Cape and Point Barrow. A further proof of that was to be found in the fact that they had picked stones off the ice which was then 12 miles from the land. As to the melting of the ice, he had no doubt that the whole of the open space through which he sailed was entirely owing to the fresh water that came down from the rivers in the interior. He wintered upon the coast and watched the progress of the ice as it gradually opened out. From what he was told by the natives, he had reason to suppose that Captain Maclure was still in the ice, and so he sent a boat to communicate with H.M.S. *Plover* at Point Barrow. That boat made her way along through the ice, and arrived three weeks before he did in the ship; but such was the difficulty she experienced in going along the coast that she was incapable of proceeding further, her bottom having been dragged out by pulling her over the ice. No doubt the Gulf Stream had no power there, and the whole of the opening along the shore was due to the warm water coming from the rivers. In his opinion, there would be no difficulty in a vessel getting from Cape Barrow to Victoria Land in one season, and he confidently hoped that some day or other an enterprising man would pass along this continent and accomplish the north-west passage by sea *viâ* Barrow Straits. With regard to the point brought forward as to the difference between the Antarctic and Arctic regions, he would mention that in 1828 he accompanied a scientific expedition that went down to the South Shetland islands. The day before entering the harbour, in latitude 64°, he counted 183 icebergs in sight. After remaining in harbour about a month, they came out the first

week in March, and the whole of the icebergs had disappeared and they only saw one between that place and Cape Horn. The icebergs had all drifted northwards—a most convincing proof of the existence of the Polar current which Dr. Carpenter had recently called attention to.

Count BYLANDT, the Dutch Minister, expressed the gratification he felt at the strong interest taken by this powerful country (which they in Holland had for many years regarded as their best friend in the world) in the naval exploits of his countrymen in past times. The great statesmen of this country were accustomed to look always forwards, showing the way to the progress of humanity; while the men of science (also of this country) had not lost the habit of looking sometimes backwards, and this seemed to be also very useful to the future.

Mr. T. SAUNDERS said the subject of the action of the sun at the Pole was of sufficient interest to deserve to be well understood. It was only at the Poles that the sun during the long Polar day constantly bore upon a single point. At Spitzbergen the sun, it was true, was constantly seen during the six months of the Polar year; but its direct rays only bore upon a given meridian once in 24 hours. The sun's direct action was constant during the whole of the six months at the Pole, and, without coming to any conclusion whatever on the subject, it still remained a fact about which there could be no question, but what its operation might be remained to be seen.

Captain ALLEN YOUNG said, with reference to the proposed Government expedition to the north, that he was decidedly of opinion that the only way to reach the Pole was by way of Smith Sound, travelling over the ice in the spring with sledges. Of course it was impossible to say what might be done in the Spitzbergen seas by pushing forward year after year; but all attempts hitherto made in that direction seemed to demonstrate the existence of a large impenetrable pack, which was reached nearly about the same latitude. None of us had been up Smith Sound, and so were unable to give more than an opinion about it. It was supposed, however, that the land extended very far northward; and if that proved the case, travelling to the Pole would be just reduced to a certain number of days.

The PRESIDENT hoped that in the future they would have abundant opportunities for discussing Smith Sound. Their especial object that evening was to give Mr. Markham an opportunity of recapitulating all that was known of Spitzbergen and the neighbouring seas. He certainly had brought together a mass of interesting facts, and no doubt had given many present a much better idea of Spitzbergen and the progress of geography in that region than they had before. Of course they would all see that the fact of the Geographical Society petitioning Government in favour of an expedition *viâ* Smith Sound did not by any means invalidate or supersede the interest which they also felt in Spitzbergen discovery. Geographers were very glad to see their particular science progress in any direction, and they felt as much interest in discovering new islands and new lands around Spitzbergen as they did in further discoveries on the coast of Greenland or Labrador in Smith Sound. The only point on which they had taken up a position was that they considered the route by Smith Sound more favourable for the prosecution of a progress toward the Pole than any other direction, and that not specially in regard to the open water, but for the facilities of sledge travelling. It was the opinion of Admiral Collinson and many others that there is ice over the whole region; and if that was so, it was more likely that they would be able to make good progress by starting from a land basis on the shores either eastern or western of the channel by Smith Sound than from the bare open sea at Spitzbergen. No one expected to steam a vessel right over the Pole; they always looked to sledging as the ultimate path towards that object. At the same time they were quite open to discuss the subject of Spitzbergen *as well as that of* Smith Sound; and although, in fact, no progress had been

made beyond what he had previously mentioned, yet he lived in hope that during this year they might be fortified with such additional arguments in favour of scientific exploration as to prevail upon Government to send out an expedition next year. The documents which had passed on the subject of the proposed new Arctic expedition had been collected in a pamphlet, copies of which would be distributed. The last move that had taken place was that the Geographical Society had proposed to the Royal Society to appoint a joint committee to confer as to the most important scientific objects to be attained from further Arctic exploration; and when that information was obtained, they would be prepared to make another application to Government in favour of an expedition to leave England in the spring of 1874.

Seventh Meeting, 24th February, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*The Marquis of Blandford; Gryf Jaxa Bykovski; William Henry Davies, Esq.; S. Y. Glanville, Esq.; Captain Beresford Lovett*, R.E.; *Augustus Margary, Esq.; John Rambaut, Esq.*, M.D.; *Frederick Reid, Esq.; Robert Short, Esq.*

ACCESSIONS TO THE LIBRARY FROM FEBRUARY 10TH TO FEBRUARY 24TH, 1873.—'Supplement to the Imperial Gazetteer.' By W. G. Blackie. Edinburgh, 1873. Donor the publisher. 'The Handy Royal Atlas.' By A. K. Johnston. W. Blackwood and Son, Edinburgh, 1873. Purchased. 'Zur Topographie von Athen.' Von P. W. Forchhammer. Göttingen, 1873. Donor the author. 'The Finding of Dr. Livingstone.' By H. Stanley. And 'The Story of the Life of H. Stanley.' By C. Rowlands. 1873. Donor J. C. Hotten, Esq. 'Remarks on the River Plate.' By Mr. Macdonell. (Parliamentary Paper). 1873. 'Blue Books on the San Juan Boundary.' Donor Lord Arthur Russell. 'Blindness and the Blind: a Treatise on Typhlology.' By W. Hanks Levy. 1872. Donor the author. 'The Campaign of 1866.' Translated from the German by Col. von Wright and Captain H. M. Hozier. 1872. With folio of Maps, &c. Donors the Topographical Department of the War Office. 'Spirit-Levels taken in the North-West Provinces of India, 1867–1869.' 'Spirit-Levels taken in the Punjab.' Dehra-Doon, 1869. 'Tables of Heights in the North-West Provinces and Bengal.' Roorkee, 1866. Donors Trigonometrical Survey of India. 'Trattato di Pronunzia Inglese.' Per T. Anselmi. Naples, 1867. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF FEBRUARY 10TH, 1873.—A valuable and rare collection of Native Maps of China and Corea, consisting of 34 Maps on rollers; and various

inscriptions from ancient monuments. Presented by W. Lockhart, Esq., F.R.C.S. Netherlands, viz.:—1st, Maps showing the Canal System (Waterstaats karte); 2nd, Catalogue of Maps published by the Institute of the Royal Engineers of the Netherlands; 3rd, Areas of the Campaigns of the Emperor Napoleon (French); 4th, Catalogue of Maps contained in the Dutch National Archives; 5th, Historical Atlas of the Netherlands from the sixteenth century. By G. Mees. Maps of the Dutch Colonies in India. The above maps by purchase. Map of Florida, U.S. By Colton.

Before commencing the ordinary business of the evening the PRESIDENT alluded to the loss the Society had sustained in the death of their honorary corresponding member Captain Maury, the distinguished American hydrographer.

The President then offered the following observations

On Badakhshán and Wakhán.

As the question of the frontier of Afghanistan was attracting so much public attention, it would, perhaps, be agreeable to the Fellows of the Society if he gave them such information as he himself possessed on the subject. In the meetings of the Society it had been their rule to exclude from the field of debate all political matters; but there were certain topics in which politics and geography were so completely mixed, that it was quite impossible to consider the one subject without, to some extent, introducing the other. The new frontier of Afghanistan was an instance of these mixed questions. After tracing this frontier on the map, he said it was not suddenly improvised for the occasion, nor had it been laid down exclusively on political considerations. All that had been required was to recognise the old frontier of the Afghan dominions. He felt some diffidence in discussing this subject, because he had been, to a certain extent, made personally responsible for the frontier. Whatever responsibility there was in the matter he was ready to take his share of; but the proposed line did not originate in London. It was arranged in the first place between the Governments of India and Cabul, and was merely sent to England for approval. On its arrival he was consulted on the subject, and proposed certain modifications which were sent back to Calcutta. These alterations having been approved there, the document was sent home again, and was afterwards communicated to the Russian Government, by whom also the line was approved. Politically all that the English Government cared to do was to recognise as belonging to Afghanistan the territory governed by the father of the present Ameer of Cabul. For a long period Badakhshán and Wakhán were in a state of uncertain dependency

between the Usbegs and the Afghans; but in 1859 Dost Mahommed Khan fairly overran the districts and incorporated them in his empire; and there could be no doubt that from that time they had been *bonâ fide* Afghan dependencies. Then the geographical question arose, as to what were the limits of this territory. The Russian Government had volunteered a declaration that Afghanistan was altogether beyond the sphere of their control and political influence, but they did not exactly know what the limits of Afghanistan were. When the first rough sketch of the frontier was brought home to England, he saw that there were certain geographical irregularities which would be somewhat difficult of adjustment. For instance, the districts of Roshán and Shignán, and the Ruby Mines, though belonging to Afghanistán, were to the north of the Oxus, while, on the other hand, a portion of Darwáz, belonging either to Khokán or Bokhárá, stretched across the river to the south. One irregularity, therefore, balanced the other, and the due distribution of territory was not greatly affected by the adoption of the course of the river as the boundary between the two States. When this view of the question, however, was communicated to the Russian Government, certain political and geographical difficulties arose. In the first place, an objection was taken that the authority of Cabul over Badakhshán and Wakhán was so slight and so precarious, that it was impossible to regard those districts as integral parts of the Afghan empire. As this objection, however, turned out to be mainly founded on the fact that there was a refugee chief from Badakhshán in the Bokhárá territory, who threatened reprisals, it was pointed out, in reply, that expatriation was really the normal condition of political society in that part of the world, every district in the vicinity, whether great or small, being subject to the same embarrassment. At present, for instance, Shere Ali Khan, the Ameer of Cabul, was in full possession of the government of Afghanistán; but the eldest sons of his two brothers, which brothers were previously in command of the country, were both refugees and pretenders to the throne. The eldest son of the King of Bokhárá was also a refugee with the Ataligh Ghazee at Kashgar. The same condition of things appeared in the minor chieftainships. Until very recently, Karategín was a dependency of Khokan, but, within the last two years, the King of Bokhara had driven out the chief, and he was now a refugee in Khokán. In the same way the chief of Kúláb, an outlying dependency of Bokhárá, was a refugee at Cabúl, and the old chief of Badakhshán was also a refugee at Hissár. Thus it was clear that, to take exception to the fixity of tenure of a government, because

there were pretenders or refugees in other countries, was altogether inadmissible. Besides this objection, arising from the insecurity of the sovereignty, Russia had, however, another ground for dissent. It was stated in the despatches that one of the reasons why the Russian Government could not acknowledge Wakhán to be a portion of Afghanistán, was that if that claim were admitted, the power of the Afghans would be extended far to the north, as Wakhán lay side by side with Karategín. Now, Wakhán was in reality removed at least 100 miles from Karategín, and the question therefore arose, How could General Kauffman have adopted such an extraordinary geographical argument? The explanation was curious, proving as it did that, up to the present day, the Russian Government had been under an hallucination with regard to the geography of the countries on their own immediate frontier. Allusion had been made in the House of Commons, a few evenings ago, to this singular geographical error, and the 'Edinburgh Review' had been referred to as the best source of information regarding it. Now, he was himself personally responsible for the statements in the 'Review,' and he had the less hesitation, therefore, in reading the following extract to the meeting, explaining the original source of confusion.

"About ten years ago, then, it was announced to the Imperial Geographical Society of St. Petersburg, by one of its most distinguished members, the late Mons. Veniukoff, that a manuscript had been discovered in the archives of the 'Etat Major,' which professed to give a minute account of all the country intervening between Cashmere and the Kirghiz Steppes. The author was said to be a German (George Ludwig von ———), an agent of the East India Company, who was despatched at the beginning of this, or the end of the last, century, to purchase horses in Central Asia, and who, having on his return from his mission, quarrelled with the Calcutta Government on the subject of his accounts, transferred his MSS. to St. Petersburg, where they had remained for over fifty years unnoticed in deposit. The chapters which Mons. Veniukoff published from this work, and which were certainly very curious, were received at St. Petersburg with the most absolute confidence, as extracts from official documents, and were cordially welcomed even in Paris; but in England they were viewed with suspicion from the commencement; and no sooner were the details brought forward than they were pronounced impossible, and the whole story of the horse-agent and his journal were accordingly declared to be an impudent fiction."

It was thus pretended that a doctor had travelled up from Cashmere to the Oxus with a guard of Sepoys, having penetrated through the mountains accompanied by camels in an incredibly short space of time. When he had reached the middle of the Pamir Steppe, it was further stated that he found horses in abundance, and had sent back 150 to Calcutta under charge of half-a-dozen Sepoys. The whole story was so absurd that it could *not be believed* for an instant, but at the same time some curious

geographical features were correctly described: the names of places, indeed, were apparently genuine, and even specimens of the Káfir language were accurately given, so that a great deal of mystery was admitted to attach to the story. Thereupon arose a controversy of some warmth, which was not yet finished.

The most plausible solution was somewhat to the following effect:—The great Oriental scholar Klaproth, it seemed, must have determined to mystify the world, whilst at the same time he replenished his own pockets. He took the trouble accordingly, in the first place, to invent a journey from the plains of India to the Russian frontier through a country which was at that time entirely unknown to the majority of geographers. To illustrate these travels, he compiled very elaborate maps, the sketch-route of the journey, indeed, being contained in twenty sheets, and the MSS. thus illustrated was sold to the Russian Government. Next he invented a Russian mission to the frontiers of India, also through an unknown country, and this he illustrated in a similar manner, selling the MSS. to our Foreign Office for 1000 guineas. Then, in order to confirm the accuracy of both these journeys from what might be supposed to be an independent source, he invented a Chinese itinerary, passing through the same regions and corroborating their geography. The whole three accounts were purely fictitious, but they were for a long time accepted as genuine both by the Russian and English Governments, and Mr. Arrowsmith was allowed to consult the Foreign Office manuscript in order to incorporate some of the details in the map which he constructed in 1834 for the illustration of Burnes's travels. The Russian cartographers, in the same way, followed the authority of their MS. and delineated the country accordingly, but the position of Wakhán was entirely wrong, and thus the Russians were misled. Colonel Yule had recently hit upon an explanation of the circumstances under which Klaproth's mistakes occurred, and his paper on the subject would be published in the next number of the 'Proceedings.' The explanation was something to the following effect:—A little more than a century ago, in 1759, the Chinese Government sent a grand expedition to the west. It was accompanied by three Jesuit missionaries, who were good observers, and who laid down all the positions, where they had an opportunity of taking observations, very correctly. They, however, did not proceed the whole distance with the expedition, but turned back from Yarkend; and after they had left, the Chinese officers carried on the investigations themselves. It seemed that they constructed their maps on the spot in *squares representing* an area of about 50 miles, and that these

squares were afterwards given to the cartographers at Pekin to be incorporated into one map. Colonel Yule had obtained from Paris a photographic copy of this Chinese map as used by Klaproth, and which was in fact the foundation of Klaproth's own map of Central Asia; and he had discovered that the square containing Badakhshán and Wakhán had apparently been turned round from east and west to north and south, so that the relative positions of places were altered by 90°. This, then, explained all the mystery. The streams which Lieut. Wood found running north and south were represented in the map as running east and west; and the valley of Wakhán, which ran east and west, was in the Chinese map turned south and north. The consequence was that Wakhán, instead of being on the same parallel with Badakhshán, was placed 100 miles to the north of it, and this accordingly was the reason why the Russians referred to Wakhán as lying side by side with Karategín. The sources of information, however, at our disposal were fortunately amply sufficient to prove the falsity of the Russian geography. They were as follows:—In 1838 Lieut. Wood, of the Indian Navy, who was with Sir Alexander Burnes's party when they went to Cabul, proceeded across the Hindú Kúsh and then followed the valley of the Oxus to its source. He was the only European who in recent times had been over that exact ground, but other travellers had been in the vicinity. Mr. Hayward, for instance, travelled from Cashmere, intending to reach the same point, but he was murdered on the frontier, while Mr. Shaw, his fellow-traveller, had not only been at Kashgar, but had made extensive explorations in the mountains south of Yarkend. Lately, also, the Russians had sent an officer, Mons. Fedchenko, from Khokán across the outer range to the Alai Plain, and the culminating ridge beyond. Besides this European information, there was also an abundance of good native data. In 1857, or 1858, Abdúl Medjíd, for instance, was sent from India to Khokán by way of Badakhshán and the Pamír Steppe, and he returned through Karategín, Darwáz, and Kuláb. His itinerary had been laid down with the greatest care, and was the best information at present obtainable with regard to the topography of the Pamír. He was indeed the only person who had laid down the two lines of route from Badakhshán to Khokán. Unfortunately his return route had been accidentally omitted from the list of trade-routes published in Davies's reports, although it was contained in the original report in the India Office. Another native officer, named Pundit Munphool, lived for two or three years in Badakhshán, and had given a very excellent account of the country. When

Mr. Forsyth went to Yarkand he sent an agent, Faiz Bukhsh by name, through the country to Badakhshán, and thence up the valley to meet his master at Yarkand, while another, Ibrahim Khan, was sent across the hills on the same line as that taken by Hayward. Major Montgomerie's Mirza and Havildar were both also in Badakhshán, and the list of native travellers was completed by Mahommed Ameen, who had collected a vast number of routes in every direction between India and Turkestan. From all these sources, then, a sufficiently accurate knowledge of the country had been gained. There was only one portion, indeed, still unknown—the great bend of the river below the ruby mines, along which no traveller had yet passed. From the Sea of Aral, for about 1000 miles upwards, the course of the Oxus was through a low country. At Kúndúz the height indeed was barely 1000 feet above the sea; but from that point the ground rose rapidly. Wood's road-book gave the elevations as follows: Kúndúz, 900 feet; Faizabád, 3600 feet; Yowl, 6800 feet; Ishkishem, 8700 feet; Langar Kísh, 10,800 feet; Lake Victoria, 15,600 feet: so that from Kúndúz to the Lake, a distance in a straight line of little more than 300 miles, the rise was very nearly 15,000 feet. Such a difference of elevation must, of course, give the stream a tremendous impetus, and accordingly, at Ishkishem, where it met a shoulder from the great Hindú Kúsh, and was deflected northward, it was a perfect torrent. It then flowed north and north-west till it turned the mountain, the whole of its course along this track being bordered by tremendous precipices. Baron Meyendorf, the Russian Ambassador to Bokhara fifty years ago, gave a very good description of this inaccessible region of Darwaz. Apprehensions were sometimes expressed that if the line of the Oxus were adopted as the Afghan limit, it might be regarded as an invitation to the Russian Government to push on from Samarkand to the river; but the chiefships in this quarter had been independent from all time, no race of conquerors having ever been able to subdue them. Strabo, for instance, informed us that the Greeks could only extend their domination as far as the Fani, whose name was probably preserved in the Fán-tăú, the Fán Lake, and even in Pamír or Fán-mír. The Kaliphs, again, were only able to reach as far as Rasht. He therefore saw no probability of Russia ever coming down and occupying Darwáz, Roshán, and Shignán: at any rate such conquests could never be of advantage to any power, for the districts contained nothing worth having. They were very sparsely populated; and the population, such as it was, was the wildest and most untameable in that part of the world. The country, moreover, was impassable for wheeled

carriages, and in many places even for horses. One Englishman, Colonel Gardiner, who was still living in Cashmere, was believed to have been through Darwáz, but he had given no sufficient account of the district. Badakhshán was one of the most delightful countries in all the East. The climate was beautiful, the pastures most delicious, and it was so healthy that invalids from all quarters visited it for the sake of change of air. It possessed valuable mines, not only of precious stones, such as the lapis-lazuli and the ruby, but also of various metals, and there were gold washings in the river. The Balass ruby was simply the ruby of Badakhshán,—the word Balass being a corruption of Badakhsh. The English Government had been taunted with giving up the famous ruby mines to the north of the Oxus, but in reality those mines had not been worked for fifty years. The country around them was perfectly desolate and uninhabited, and he believed no more rubies were to be found there. The lapis-lazuli mines, on the contrary, were really valuable, and were in the heart of the country. On the south, Badakhshán was bounded by a high range of mountains, through which there were only a few passes, and those very difficult and quite impassable to an army. More to the eastward, however, at the end of the Chitrál Valley, there was a very easy and excellent pass, called the Biroghil Pass. As the range gradually merged into the Pamír the rocky crests disappeared, and the country opened out into a high tableland, just as in Thibet. The ascent and descent were very gradual, and if there was a gate to India, it was there; for in reality the Biroghil was the only pass, in the whole of the range from Herat to the eastern limit of Thibet, at all adapted to the passage of an army. In estimating the danger of the Russian advance towards India, he did not think that sufficient consideration was generally given to the exceedingly difficult and anomalous position which Russia occupied in those regions at present. It was the first experiment she had ever made in governing an exclusively Mohammedan country—assuredly one of the most difficult things in statesmanship. England had only once made such an experiment, in the case of the occupation of Afghanistan, and had learned the excessive difficulty of carrying it out successfully. France, too, had been endeavouring to amalgamate Algeria with the French Empire for forty years; but the Arabs were as ready to rise now as in the first year of their subjection. The Trans-Caucasian provinces of Russia were sometimes referred to as a case in point, but there a large Christian element balanced the Mohammedan element. He believed that Russia was only just beginning to appreciate the *extraordinary* difficulty of governing an exclusively Mohammedan

country—and especially a fanatical country—such as Turkistan, south of the Great Steppes. It might not be impossible to achieve success, but the end could only be gained at a great expense and at a great sacrifice of life. At the present day, Russia expended half a million sterling in excess of all proceeds, in order to keep her position in Tashkand and Samarkand. If she occupied and retained Khiva, she must certainly spend another half-million; and a drain of 1,000,000*l.* sterling, annually, would be a serious consideration for a poor country like Russia. She would most prboably find it more advantageous to withdraw after taking security for the future good conduct of the Khan. At any rate, she could get no return from the country, and her only object therefore in retaining occupation would seem to be to increase her moral leverage in Europe. We might safely leave such questions to the consideration of the Government; he would only say that he regarded the recognition of a fixed frontier for Afghanistan as an element of tranquillity and security. There certainly was no occasion for Russia to approach any nearer than she was at present; and there could be no doubt that the Government of Cabul would attend to the advice of the English Government, so far as to keep clearly and strictly within her own limits. There was no inducement, indeed, for Cabul to transgress the limits, or to cross the Oxus to the north, nor was there any inducement for Russia to extend her possessions to the south. He had not in this address gone into the subject of Russian progress on the east coast of the Caspian; but he regarded that as a far more important matter than the dispute about Badakhshán and Wakhán, and he hoped to express his views upon it on the 24th March.

Mr. SHAW said he was probably the only living Englishman who had ever met with natives of Wakhan, and their definition of that country agreed with that given by Sir Henry Rawlinson. There was a colony of Wakhanis in the territory of Yarkand, where they had been settled for the last forty or fifty years. He had also heard similar accounts of the country from travellers who crossed from Yarkand yearly.

Lord LAWRENCE said it was entirely out of the question that Russia should ever be so insane as to attempt a movement on India from the country which Sir Henry Rawlinson had described. He was quite convinced, from what he had heard from the Afghans themselves, and from the late Amir Dost Mahommad and his sons and grandsons, that the action recently taken by England would be thoroughly appreciated by the Afghans. They had their fears of some day or other being invaded from Central Asia, and therefore they would recognise the value of the steps taken by the British Government with regard to their frontier. If there was any portion of Badakhshan or Wakhan, on the north side of the river, he believed it was not worth having, and that the Amir himself would say as much, and be too grateful for what England had done, to raise any objections. Every other consideration was perfectly insignificant, compared with that of having a strong and suitable boundary. It had been *stated in some quarters that*, by the arrangements recently made with Russia

great complications would arise in those parts of Asia; that the Afghans encouraged by British support, would make incursions across the Oxus and thereby incite retaliation; but the Afghans had no inducement to cross the river. If they should be so rash as to do anything of the kind, they would only bring down on themselves the very dangers they were anxious to avoid. Moreover, while England was prepared to give them assistance, such as our interests might justify, we were not bound by treaty to do anything for them; and this circumstance would be the strongest possible inducement for them not to get into trouble. We had given them assistance on various occasions, and had given them subsidies, and shown that we wished to efface the memory of the old days when we invaded their country; and the policy which had been pursued would go far to conciliate the Afghans, and show them that their interests and our interests were to a very considerable extent identical.

Mr. DANBY SEYMOUR wished to know if the Russians had, by the recent arrangements, obtained permission to advance as far as the Oxus. He had understood that there was to be an intermediate neutral land, and he considered such an arrangement would have been the best that could have been made.

Mr. SAUNDERS said, as the basin of the Upper Oxus was traversed by a continental trade-route, it was most important that Russia should not be allowed to take possession of it, and bar the passage of the maritime trade with the Black Sea, the Levant, and the Persian Gulf, by means of a prohibitive tariff. She would be most likely to do so with the parallel route by way of the Jaxartes, and the closing of the Jaxartes route would render the retention of the Oxus for free-trade all the more necessary. He alluded to the defective state of European information respecting the highlands drained by the Oxus, and to the difference of opinion expressed on that subject, and recommended further exploration.

Dr. BALL said it was not wise to attempt to make arrangements with any great Power which we should object to ourselves. A neutral land merely meant a permanent nest of robbers, and would prove in the end a most unsatisfactory arrangement.

The PRESIDENT said there never had been any invitation to Russia to advance to the Oxus, neither had there been any definite arrangement for a neutral zone. The only question that they had had to consider was, what were the boundaries of Afghanistan? It was an essential element, however, of consideration with the Afghan authorities that the trade-route between Eastern and Western Asia should not be closed, and he trusted it would always continue an open road for the commerce of all nations, free from anything like a prohibitive tariff.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Report on the Expedition to Falaba, January to March* 1872. (*With an Appendix respecting Dr. Livingstone.*) By EDWARD W. BLYDEN, M.A.*

IT was originally intended that the expedition should proceed hence to Port Loko, and thence, by what is known as the Port Loko route to Falaba, and my instructions were written accordingly: but in consequence of the unsettled state of Port Loko, caused by the sudden death of the Alkali, it was concluded, just before the start, that the expedition should set out from the Great Scarcies River, and adopt, if possible, a new route to Falaba.

On the 6th of January the Expedition left Freetown for the town of Kambia, where we arrived on the 9th.

On the morning of the 10th I had an interview with the chief, Almamy Al-Hay, and his principal men. I read to them a part of Governor Kennedy's instructions to me, and made the Almamy a suitable present in the name of the Queen. During this interview I was able to gather the following facts:—

The present unsettled state of the country is owing to the influence of one Bilâli, a native of the Kissy country, and formerly a slave among the Soosoos. About twenty-seven years ago he ran away from his master, Almamy Mumineh, now residing at Kukuna, and founded a settlement between the Soosoo and Limba countries, to which numerous fugitives have, from time to time, betaken themselves.

By numerous accessions of that class of persons, Bilâli has succeeded in forming a powerful party, and in rousing amongst a large portion of the servile population, not only a devotion to the idea of liberty at any price, but a strong attachment to himself and a hatred for all who hold slaves; and he is by no means scrupulous as to the price he pays for their support.

On the other hand, the slave-holding chiefs, in various parts of the surrounding country, except those of the Limba district, have formed a combination against him, alleging, when appealed to in favour of Bilâli on the ground of the abstract right of every man to personal liberty, the same argument that is always used by oppressors, viz. granting that Bilâli has just cause for rebellion, granting that he is wise in perilling his personal ease and security for the sake of liberty, still his course (as they hold) is producing a confusion in the country, which will eventually beget a state of things much worse than that against which he and his allies have risen. Standing on the basis of this, to them conclusive argument, they are anxious to crush Bilâli, but it seems that their combination is powerless against him.

The town of Kambia, situated near the rapids of the Great Scarcies River, about 50 miles from its mouth, is a great centre of trade. Hither are collected persons from various quarters, of conflicting views as to the merits of the Bilâli contest—Timmanees, Soosoos, and Limba people. The first two are

* In 1822, the celebrated Major Laing, who was afterwards killed at Timbuctoo, went from Sierra Leone to Falaba, and was not allowed to pass that town. The next European who visited it was Mr. Winwood Reade, in 1869. He was also detained; but, in a second journey, was permitted to pass Falaba, struck the Niger fifty miles beyond it, and went to the gold mines of Bouré. Mr. Reade travelled as an envoy of the Sierra Leone Government, and Professor Blyden was sent to *Falaba three years afterwards.*—[ED.]

against Bilâli; the last sympathise with him; so that there is danger of civil discord in the town, which is kept from breaking out only by the presence and influence of the European and Sierra Leone traders.

The king, somewhat advanced in years, and apparently of pacific disposition, is anxious for the peace and security of his country. He entreated me to invoke the assistance of the British Government against Bilâli. He states that no native chief can put down that energetic insurgent without the aid of the British Government. For nearly a whole generation he has defied the power of all the Soosoo and Timmanee chiefs.

It occurs to me that this matter can be settled only by a concession on both sides. The Soosoo and Timmanee chiefs must abate their impetuous contempt of Bilâli on account of his servile origin, and agree to make no demands upon him, in the future, for the surrender of their fugitive slaves; and *he* should agree to encourage no more slaves to resort to his asylum.

But this is a very difficult subject to be handled by a Government, all whose dealings with uncivilised tribes are based upon anti-slavery principles.

The king is also anxious to have schools established in his town for the instruction of the children in the English language.

Opposite Kambia, on the northern bank of the Great Scarcies, is the Mohammedan town of Billeh, whose presiding genius, Fode Tarawally, enjoys great literary celebrity. Billeh is a sort of University town, devoted altogether to the cultivation of Mohammedan learning. On the 12th of January I visited it, and made a small present to the literary chieftain. I found him seated in a hammock in his spacious verandah, reading a manuscript. Around him were gathered his pupils seated on mats. He received me with an easy grace and dignity, and had all the gravity and reserve of a teacher. He addressed me occasionally in Arabic, but he spoke generally in the Soosoo language through an interpreter. He not only seemed at home in the dogmas of his faith, but he discussed instructively some of the most important subjects of human inquiry, and quoted, in support of his views, the opinions of leading Arabic writers. He spoke in high terms of Beidhwai and Jelaladdin as commentators on the Koran.

Fode Tarawally is aided in his duties by three of his sons; his pupils number several hundred young men; there is also a class of girls. I was not a little surprised to find so much literary cultivation and intellectual activity in this small town, altogether secluded from European influence; and I left it highly gratified at the exhibition I had witnessed of capacities and susceptibilities utterly inconsistent with the theory that dooms such a people to a state of perpetual barbarism or of essential inferiority to the more favoured races.

The Stipend System.—From what I could learn here, it appears that while the stipend system has numerous advantages, it is far from being as effectual as it might be in promoting the pacific objects for which it was established, on account of the absence of special resident Agents or Commissioners from Her Majesty's Government, whose duty it would be to see that the chiefs observed their treaty engagements, and to aid them in suppressing certain refractory individuals among them called "warriors," who are the chief sources and fomenters of disorder. They profess great devotion to the interests and honour of their chief; but they are among his most pernicious friends. These "warriors," it appears, are never so fond of their king as to lose an opportunity—even at the expense of their master's good name—of pillaging the weak; or too loyal to encourage any confusion in the country which gives them a chance for plunder. Very often the king is helpless to control or check the predatory operations of these robbers, and is, in consequence, exposed to the censure of being unfaithful to his engagements.

Now, if there were stationed at important points in the country Government Agents, who, on representation from the chiefs, would arrest the leaders

of these organised mobs and send them to Freetown to be kept in confinement, with or without hard labour; the effect of such a course, adopted in two or three prominent cases, would be most favourable to the peace and quietude of the country.

I left Kambia on the morning of the 20th of January at 10 A.M., and reached Kukuna on the 22nd at 9 A.M., after 14 hours' travel, exclusive of rests, in the general direction of E.N.E.

The country, for the greater part of the way, seemed more suitable for grazing purposes than ordinary agriculture, though I saw some extensive fields of ground-nuts and beni-seed. As we approached Kukuna the soil became more fertile, and we passed through a heavily-timbered section. We met very few persons on the road; it is lonely and unfrequented on account of the Bilâli war. On the second night of our journey we slept at Bolon, a town of which the greater portion has been recently burnt by Bilâli's men.

In the neighbourhood of Kukuna, the country gives sad evidence of the dire results of war. We were surrounded by lamentable illustrations of a war which has lasted during a whole generation; and it is difficult for one at a distance to frame any clear idea of the state of society induced by this protracted contest, kept up by determined slave-holders in the vain hope of reducing to servitude a man to whom there is no equal in the country for military prowess, tact, and ability.

Every day the Soosoo power is growing weaker and Bilâli increasing in strength. Slaves are continually flocking to his standard; while the Soosoo combination, consisting of the incongruous elements of masters and slaves, is no more reliable than a rope of sand.

The chief of Kukuna, Almamy Mumineh, the former master of Bilâli, is now reduced to extreme poverty. His resources have all been exhausted in the war, and he is the unfortunate victim of his warriors. Whenever these robbers return from an unsuccessful maurauding excursion, they seize upon everything in the shape of food and clothing that they can lay their hands upon, and appropriate it to their own use.

During my first interview with Mumineh, when I presented to him a few articles in the name of the Queen, I besought him to take measures to put an end to the war fruitful only of damage to the prosperity and reputation of his country. I endeavoured to show him that the instrumentality which he opposes to Bilâli—as the prolonged contest so barren of results in his favour has proved—is weak and unreliable, and that the resisting materials, multiplying every day, are too strong for him; and I urged upon him the wisdom of at once ceasing from hostilities.

After I had withdrawn, he sent a messenger to me to say that the articles I gave him he had been obliged to give to his principal men; that not even a leaf of tobacco had been left for himself, and requesting me to give him a suitable present for the Kali Manga or war chief, Santigga Fode, who occupied a garrison town a little distance north-east of Kukuna.

On my return to comply with his request, I took occasion again to call attention to the deplorable condition to which war had reduced himself and his people; that men 30 years of age, born in his country, had not known one day of peace. I pointed out the constant fear of invasion which haunted his people, deterring them from the pursuits of remunerative industry, and entreated him to consider, at once, the importance of making peace.

He replied that it was hard for a master to make peace with his slave, especially a slave who had not only revolted and run away himself, but who is in the constant habit of abducting other slaves and even of decoying away the wives of his master; and that he had always thought it hard that the British Government seemed to take Bilâli upon their back, while this was the first kindly message he had ever received from that Government.

I told him I was glad he had referred to the posture which the British

Government had hitherto maintained towards him, inasmuch as it gave me the opportunity of pointing out the advantages which would accrue to himself and his country if they could secure the favour of the British Government by desisting from a war to recover fugitive slaves, in which he could never have the sympathy of the Queen, whose principles and policy are opposed to slavery. I assured him that if he would recede from the aggressive pro-slavery policy to which he had adhered for the last thirty years, and his pacific resolutions were known to the Governor-in-Chief at Sierra Leone, and the Governor could be satisfied that the trade would no longer be obstructed, he would enter into treaty with him as he had done with the Alkali of Port Loko and other native chiefs.

He said he felt the force of my remarks; that he was now old and tired of the war; if the Governor of Sierra Leone would go to Kambia or send proper officers thither, and order himself and Bilâli to meet there to arrange the long-standing difficulties, he would be glad to shake hands with Bilâli and put an end to the war.

I beg most respectfully to urge upon the Government the importance of the suggestion offered by Mumineh—the first pacific expression, it is said, that has ever escaped his lips with regard to Bilâli; and I am informed that Bilâli is willing to give up hostilities, and enjoy in peace the personal freedom and political independence he has so long struggled to maintain. If your Excellency will send men as soon as possible to Kambia to attend to these matters, the whole aspect of this country would be changed for the better; and a most interesting region, rescued from the hands of an organised band of robbers, would be opened to a pacific and lucrative trade.

I am the more disposed to credit the sincerity of Mumineh in the desire he has expressed for peace from the fact that ont he 17th of January—four days before I saw him—his combined forces attacked Kolonkureh, one of Bilâli's strongholds, and captured it on the 18th, after four-and-twenty hours' hard fighting; but on the 23rd, the victors attempting to press their advantage and advance into the enemy's country, were repulsed from the first town they attempted to invade, which has produced the impression that Bilâli, not caring much for Kolonkureh, has withdrawn from that point to decoy his enemies into the heart of the Limba country, where most of his towns are situated.

The town of Manga Fode, the war chief above referred to, is about two miles beyond Kukuna on the road to Falaba. This man stands at the head of Mumineh's mercenary troops; he holds the road to Falaba. Though nominally subject to Mumineh, he exercises a most tyrannical sway over his master. Notwithstanding the presents I gave on my first arrival, besides being subjected to the expense of complimentary visits from the troops, I was obliged to pay an additional tribute of four pounds to conciliate this callous and otherwise inexorable potentate, in order to secure the right of way through his fortifications. The day after I had submitted to this supplementary exaction, one of the active commanders in the war, just from the front, called to assure me of the very serious difficulties on this road, after leaving the jurisdiction of Mumineh, growing out of the presence of wild plunderers who, it was alleged, have no knowledge of, and no regard for the Sierra Leone Government, and urging upon me the necessity of employing, to "stand before" the Expedition until we reached Falaba, one of Manga Fode's warriors; that the name of Manga Fode and the reputation of his war medicines were well known and dreaded along the whole route. Mumineh also, who seems to be a simple-hearted man, anxious for the good of his country, expressed to me his desire that one of Manga Fode's men should accompany me. I therefore employed one of these men to take us through the "wild and dangerous country" to Falaba, more to satisfy the people here, and to secure *the Expedition against* possible treachery on the part of our advisers, than

from any serious apprehension I entertained of danger from the people further on.

The Seracoulie people, who bring hides and gold dust from the interior, would prefer passing through this country, as the route is much more easy to travel; but they dare not come this way except in large numbers, so as to protect themselves against predatory bands. I met, when I arrived at Kukuna, 200 Seracoulie traders on their way to Sierra Leone, with hides and gold; and a company with 300 head of cattle were expected in a few days. But if the war were ended and the warriors relieved of the excuse of preying upon defenceless traders, these strangers could come in small numbers and more constantly.

This region of country, from its exceeding fertility, abundance of good timber, and the large supply of water, is well adapted for colonisation. A colony of Africans from Sierra Leone or the Western hemisphere, of men willing to engage in agriculture and moderate trading, would very soon rise in wealth and importance, and save the country from distracting wars constantly stimulated by the "Krugbahs," or warriors, who eke out a miserable existence on the proceeds of their nefarious engagements; but so strong is their indisposition to work that they prefer to subsist, however wretchedly, on the produce of other people's labour.

The prospects of single missionaries stationed at isolated points in this country would be far from encouraging. It seems to me that in order effectually to influence these tribes, Christianity will have to be presented to them in the concrete form of daily practical life, through the instrumentality of Christian settlements. Not by abstract dogmatic teaching and preaching only is this land to be regenerated; but the doctrines of Christianity must be exemplified in the life and habits of Christian communities.

It is by means of such aggregate and organised influence that Mohammedanism has obtained its astounding development, and is continuing its onward course as a living missionary force in Central Africa. Wherever it is possible to do so, in pagan districts, Mohammedans congregate and form towns for trading and farming purposes; and regularly every day the neighbouring pagans have an opportunity of witnessing the exemplification of the doctrines of Islam in the unvarying practices of its followers.

Early on the morning of January 27th we took our departure from Kukuna with no lingering regrets at leaving a people in whom the long struggle in which they have been engaged has developed some of the most deplorable traits of humanity.

On the morning of the 30th of January, when about 35 miles north-east from Kukuna, our course being E.N.E., we crossed the Great Scarcies River, which we found flowing from the south-east, and taking, at that point, a westerly direction. It appears that the river at that point, by a sudden bend, diverges from its general direction of north-east to south-west. The stream is here small and shallow—about 15 yards wide—easily fordable in the dries, but of very rapid current. On the western bank is situated Kufuna, the last town in the territory of Mumineh in this quarter. Here we met a caravan of Seracoulies with cattle on the way to Kambia.

Kufuna, formerly a large and important town, has gradually dwindled into insignificance: but, since trade has again taken this direction, it is being rapidly rebuilt.

Ganjah, where we stopped one night to procure carriers, is a town of moderate size, containing a population of about 1000, presided over by Seyyu Suri, a Muslim chief of some personal dignity and intelligence. He received us with great courtesy, and did all in his power to facilitate our progress to the dominions of his next neighbour on the east, whose chief town is Yimbereh. Ganjah is also situated on the western bank of the Great Scarcies.

The region of country through which we passed after we left Kambia, up

to this point, a distance of about 100 miles, is of exceeding interest. It is mostly rich prairie land, with patches of heavy forest here and there. The soil in many places is of a rich, dark, fertile mould, supporting very luxuriant herbage and an ample supply of timber. Ground-nuts, guinea-corn, beni-seed, and rice, are cultivated in large quantities. Potatoes and other esculent roots of large size and excellent quality grow abundantly. Oranges, mangoes, guavas, pawpaws, and limes, are plentiful. The soil is also well-suited to the production of sugar-cane and coffee as well as ginger and arrowroot. We passed through prairies where thousands of cattle might easily feed and fatten; while it would be comparatively easy to enclose 50, 100, or 500 acres, and produce in unlimited quantities the articles above mentioned.

The people here informed me that, with little labour, they could produce almost anything they desired, and to any amount, if there were markets accessible for the sale of their products. Furnish a convenient market for these people, and no country in the world would surpass this region in the abundance and variety of its production. Iron ore of the greatest purity is widely distributed; and we saw several smelting furnaces, where large quantities of that useful metal are produced.

Questions of the practicability of railways in this part of Africa are now exciting some interest in England and America. So far as I have yet observed, the face of this portion of the country would present very few obstacles in the way of prosecuting such an enterprise. The land is gently undulating, and, I think, it nowhere rises more than 500 feet above the level of Kambia, the head of boat navigation on the Great Scarcies.

It is obvious that an almost level country affords the utmost scope for the construction of good common roads in the first instance, and of railroads at no distant period. The creeks and rivers to be crossed are very few and mostly shallow; so that the transit from Kambia along the whole route, even as far as Falaba, would offer very few engineering difficulties. And it would be impossible to estimate the vast results, agricultural, commercial, and political, which would accrue to this country from the presence of a railroad. The expense would be comparatively insignificant, as lands could be secured for a mere trifle; and the traffic which would be attracted to the road from various wealthy districts, now entirely unknown even by name at Sierra Leone, would in a short time enrich shareholders in such an enterprise, and develop to an extent now incomprehensible, the commercial importance of the colony.

The next town of importance which we met after leaving Ganjah was Sumata, beautifully situated in the midst of surrounding hills. This town is about 32 miles east of Ganjah at the source of the Great Scarcies River, on its eastern bank. This river here flows in a south-easterly direction, and is such a tiny stream that a man can easily step over it in the dry season.

Sumata is a town of considerable importance, as nearly all the caravans from the interior pass either through it or in its near neighbourhood.

Not far south-east from Sumata is Samaya, another town of great influence on this route. After leaving Ganjah, as our course lay almost due east, we left Samaya on the right, but passed across the northern portion of its territory.

While at the village of Korokoro, 16 miles east of Ganjah, where we halted for the night, armed messengers arrived from Mambarillai, King of Samaya, demanding by what authority we were passing through his territory, without calling at his capital or having first consulted him, and peremptorily ordering us to retrace our steps and repair at once to Samaya. In vain I urged upon the messengers our ignorance of the country, and the haste with which we were proceeding on an errand from the Governor of Sierra Leone to Falaba, visiting all the chiefs on our immediate route. They imposed a fine of seven pieces of cloth and two bars of tobacco, which I was obliged to pay before we were *allowed to proceed.*

On the morning of the 3rd of February, about 16 miles east of Sumata, midway between the towns of Koto and Yimbereh, we crossed the Little Scarcies River, which is here a bold stream about a quarter of a mile wide, and at this season of the year about 3 fathoms deep.

The name of the king of Yimbereh is Yimbaka, a venerable old man of great influence in this quarter. He received us very kindly, and expressed deep interest in the objects of our visit. Not long before we entered the town there arrived nine Seracoulies in great distress and consternation, stating that the caravan in which they were proceeding, when two days on this side of Falaba, was attacked by a large body of Hooboos,* several of their number killed, their women captured, and all their goods plundered. They fought bravely for five days, but were overpowered.

In consequence of this intelligence we found the town of Yimbereh in great excitement. The king and all his head men advised us to suspend our journey for a few days.

The Hooboos are a terror to this region. They are renegade Foulahs in rebellion against the King of Timbo. About twenty years ago, in consequence of some oppressive exactions imposed by Almamy Omaru, the then reigning sultan, they revolted, and went off with their families and settled on the pasture lands between the Futah and Soolima countries. They are called *Hooboos* or *Hubus*, because when they set out from their home, they went out singing an Arabic Mohammedan ditty, in the chorus of which the word Hubu occurs twice; it runs thus:—

"Nuhibu rasul Allahi huban wahidan."

"We love the prophet of God with a united love."

Their mode of life has rendered them fierce and impudent. They are nomadic in their habits, having no regular settlements. They are acquainted with Arabic books, and teach their children letters; but the country over which they roam seems to afford no scope for their energies. And in all communities where there is an active people without employment, there takes place a general uneasiness among the population, which gives birth to all sorts of offences against property. The only kind of farming for which their soil and products are adapted is the breeding and grazing of cattle, which requires the employment of a few men. They are, therefore, jealous of the Soolima country, of which Falaba is the capital, on account of its vast agricultural capacities and its commercial importance, caused by the trade which passes through it to and from the Mandingo, Seracoulie, and Sangara countries; and their constant effort for years has been to diminish the influence of Falaba by rendering its neighbourhood unsafe for traders.

The Hooboos, moreover, being Mohammedans, while the people of Falaba are pagans, invoke certain doctrines of their religion which enjoin war against infidels, to give a sanction or an excuse to deeds which disgrace humanity; and they are fast developing their occasional and unconnected acts of brigandage into a regular system of pillage and plunder, under the dexterous euphemism of war against the enemies of Islam, by which they enlist in their horrible service recruits from amongst the zealous Mohammedan youths in their country. A railway, passing through this country, would cure all these evils and confer incalculable blessings upon the people.

I am credibly informed that the existence of this organised band of robbers is a matter of serious and constant regret to Almamy Suri, the reigning Sultan of Timbo, to whom they owe allegiance. Not only do they excite and maintain a highly dangerous ferment along the roads, but they not unfrequently issue irritating menaces against Timbo itself, though they know that any

* Natives of a region northward of the Great Scarcies.

earnest effort put forth against them by their sovereign would easily annihilate them.

Considering the amount of trade which these Hooboos annually divert from Sierra Leone, and in view of the fact that they are increasing in power and extending their movements every year, it becomes a serious question, whether it is the duty of the Government to remain passive spectators of the atrocious repression by which the unprincipled activity of these vagabonds would extinguish the interior traffic; whether not only the property and lives of the aboriginal friends of the Government, but of British subjects trading in the interior, should be abandoned to the will and cupidity of a lawless horde.

I take the liberty of inviting your Excellency to a serious consideration of this important subject—vitally important to the people of Falaba and the further interior, and to the security and liberty of trade; and I would most respectfully suggest that an agent of the Government be sent with suitable presents as soon as possible to Timbo—an arrangement which Sir Arthur Kennedy had in view—to confer with Almamy Suri on the subject, and advise him, in the name of the rights of humanity and in the interests of a free and unhampered trade, to take measures effectually to prevent his revolted subjects from repressing by violence and plunder the commercial intercourse between the interior and the coast.

I am persuaded that such a mission to the King of Timbo would not be without some useful result. I found all through the country that the liberal dealings of Sir Arthur Kennedy with the leading chiefs had produced the conviction that Great Britain has no object in her policy with the aborigines inconsistent with the prosperity and integrity of their country.

Under the guidance of King Yimbaka, the Expedition left Yimbereh. The king accompanied us to Dubayah, a town within his jurisdiction, about 12 miles further east.

There were so many rumours afloat about recent depredations committed on the road between Dubayah and Falaba, that the king was anxious to satisfy himself of the possibility of the Expedition proceeding in safety before he would allow us to advance.

Dubayah is a well-fortified town, containing about 1000 inhabitants, and possesses some pictorial interest. The spurs of a range of hills, running from the north, gather into an amphitheatre around it. The hills are covered with tall grass, of a yellowish colour, dry at this season of the year, while the valley in which the town is situated is cheerful with vegetation of a fresh and beautiful green.

We were detained here six days, while messengers were sent to neighbouring towns on the north and east, to make inquiries concerning the operations of the Hooboos. About 10 miles south-east of Dubayah we crossed another branch of the Little Scarcies River, flowing from the east in a westerly direction. We now entered a hilly and dreary country, over which we travelled for a distance of more than 50 miles, till we entered the Soolima country. This is the section of country infested by the Hooboos, and where they committed their last act of plunder. We pushed rapidly through, and came suddenly to Kamalafi, a Limba town, situated in an almost inaccessible mountain recess, a fit retreat for robbers and banditti. The King of Kamalafi is in league with Abal, chief of the Hooboos, and he has, I am informed, great influence over that robber chief. He was startled at our sudden arrival. I presented him with a few valuable articles in the name of the Queen, from the Governor-in-Chief of Sierra Leone, assuring him of the earnest desire of Her Majesty's Government to promote the welfare of his country, by making the road safe for travellers and traders, and of the readiness of the Governor-*in-Chief to* co-operate with any chief who is well-disposed towards the *British Government* and its plans for opening up the country. The king

seemed very glad that in that out-of-the-way place, considered so dangerous, he had been visited by a messenger from the Governor of Sierra Leone. He expressed no opinion as to the road, except to assure us that nothing would molest the Expedition. He treated us with great kindness, and on the following day sent his son to clear the road before us.

From Kamalafi we set out for Bafudeyah, another Limba town in sympathy with the Hooboos. Here we were received with great coldness, for the news of our approach had preceded us, and the chief had learned that we were on our way to Falaba, towards which town the Limbas in this quarter have no friendly feelings. Bafudeyah is the only town along the entire route at which they gave us no cola-nuts, which are always presented to strangers on entering a town, as an expression of welcome. They made us pay for passing through their town, and would allow us to employ no carriers from among their people.

At length, after a great deal of perplexity, suffering, and expense, the Expedition arrived safely at Falaba on the 1st of March, on the fortieth day after leaving Kambia, and on the fifty-third from Freetown.

The King of Falaba received the Expedition with great kindness. On the first day of our arrival he summoned his troops and principal men, and gave us the privilege of a military review in the royal square. He himself took part in the war-dance, a feat, it is said, performed by him only on extraordinary occasions.

He deferred hearing the message from the Governor-in-Chief until he had presented me with a gold ring and a few cola-nuts, as a token of welcome to his town. On the following day, in private council, I read to him the Governor's communication, which he received with evident manifestations of joy and pride, and said how highly gratified he was in being made the object of such frequent messages from Her Majesty's Government. He begged me to assure the Governor that he has put himself and his country under the protection of the English; that the country is open to British subjects as far as the influence of Falaba extends in the interior; that whatever the Governor of Sierra Leone wishes him to do he will do, for he believes that Her Majesty's Government have at heart the welfare of his country, as in all their dealings with him they show that they consult his honour and influence. But he regretted that, in consequence of his town being in daily expectation of an attack from the Hooboos, he was unable to do much to make our sojourn in his capital interesting and agreeable.

Nearly every step of the journey from the coast to Falaba had its peculiar and unforeseen stumbling-blocks to be cleared out of the way. Every step was hampered with singular forms and expensive ceremonies; and no amount of experience or forethought could provide successfully against the capricious and tortuous methods of the people in these regions.

We have the consolation, however, of knowing that we have traversed a region seldom, if ever before, penetrated by any foreigner; and we have discovered a route of which its advantages over the Port Loko route* are, that most of the travelling is over a level country, and that one language—the Soosoo—is spoken along the entire route.

On arriving at Kambia, I found that we had made a serious mistake in not having procured sufficient carriers at Freetown. We found ourselves altogether at the mercy of the native carriers, or rather of their masters, the chiefs and head men, who charged us what they pleased, and fixed the amount of load each man should carry, and the distance to which he should go. We had a tent with its equipage, bales of tobacco, cases containing presents for the chiefs, boxes for clothing and books, supplies of food and medicines, cooking utensils, &c.; and the natives multiplied the number of carriers, by making

* *Taken by Mr. Winwood Reade.*

what would be one man's load at Freetown three men's, and would not carry for more than two or three days' journey. They then left us in the hands of another chief, more impracticable and less intelligent than the last, who would further divide the loads so as to increase the number of carriers from his town; and, for a less distance, he would charge the same or a greater price. Our train of carriers became, under these circumstances, unnecessarily large—producing the impression upon every town we passed through that we were carrying a great deal of money to Falaba; and each chief strove to make us leave as much as possible at his town.

After I had given what I considered a suitable present to a chief, he would be sure to demand an additional amount for the right of way, alleging his paramount influence on the road. They seem unable to understand the idea of a free passage through their country. Entirely unacquainted with the usages of civilized nations, they cannot appreciate such a thing as motives apart from immediate mercenary interests. They supposed that, in passing through their country, we were reaping some immediate pecuniary advantage, and it was but fair that they should have a share in that advantage. And knowing that we were helplessly dependent upon them to carry our effects from place to place, they detained us in their towns as long as they pleased under the pretext of getting the carriers together.

They are, however, not entirely ignorant of the vast resources of their country, and of the advantages of having it opened to trade. When I told them of the desire of Her Majesty's Government to promote the welfare of their country by developing trade and agriculture, of which desire my visit among them and the presents I gave them were the proof, they always seemed pleased, and expressed a hope that the Government would carry out its idea.

The route adopted by the Expedition from Kambia to Falaba must be considered the darkest portion of the interior accessible from Sierra Leone. No foreigner had ever before traversed it, especially on a mission from Her Majesty's Government. The people are, as a rule, besotted pagans, entirely at large from the influence even of Mohammedanism. Indolence has long been their habit. They live altogether by the labour of their slaves, and by extorting heavy taxes from the poor interior traders who happen to pass through their towns.

The ordinary instincts of human nature, which suggest plans for growth and improvement, have not been developed in them. They have existed for ages under conditions entirely incompatible with human progress.

They suffer from the usual evils which attend on any extensive system of slave-holding. All their work is done by slaves. Their agriculture is confined to the most fertile portions of land; and vast districts, becoming, under the deteriorating effects of slave industry and negligent and unskilled labour, constantly larger, are wholly surrendered to nature and become wildernesses. Such is the origin of the three days' wilderness on the north-west of Falaba. The great road from Futah and the Mandingo Country to the coast formerly lay through this region.

These tracts, thus abandoned, become the resort of hordes of robbers from the nearest towns, who, too poor to keep slaves, and altogether averse from the restraints of settled labour, give themselves up to the precarious life and atrocious practices of the wilderness. These marauders are the common enemies of the peaceful and industrious people of the interior and of the traders on the coast; and I cannot conceive that it would be interfering unduly in the domestic affairs of the country to employ energetic measures to suppress these robbers and murderers.

The passage of the Expedition through this country was the first intimation they seem to have had that there is an outside world having any knowledge of *them, or feeling* any interest in their welfare. And it is to be hoped that a

feeling of self-respect has been inspired within them. They will feel hereafter that they are objects of the thought and regard of Her Majesty's Government, and they will be careful how they enter upon those acts of aggression and plunder for which certain sections of their country have been notorious.

There is no doubt that there are great difficulties in the way of imparting civilization to this portion of Africa; but one of the most efficient means towards that desirable end, is the fostering of commerce by making the roads safe for caravans and single travellers.

Any measure that will tend to promote and preserve peace in that country, unfetter the operations of trade and agriculture, and give quiet to thousands of homes, which have never known it, deserves all the attention of a sound statesmanship and a true philanthropy; and there are connected with this new route political considerations of interest to the future of Sierra Leone which ought not to be overlooked. There are numerous natives of Sierra Leone and other British subjects engaged in trade on the great Scarcies River and at Kambia, which is an outlet for a large portion of the trade from Futah and of the Soosoo country; and it would be, at this moment, a comparatively easy matter for British traders to monopolise the whole traffic of that quarter, and thus establish strong ties of commerce and mutual interests between the Colony of Sierra Leone and the tribes which the Expedition has visited.

In the meanwhile, it is of the utmost importance that everything be done to encourage and develop the trade of the distant interior, of which Falaba is the emporium; and therefore I have been highly gratified to hear of the kind and liberal treatment accorded by your Excellency to the son of Alfa Mahmud, King of Kankan, and his companions during their recent visit to this Colony.

The King of Falaba informed me that he regards Sierra Leone as the natural outlet for the trade of his own country, and of the Seracoulie, Mandingo, Bouré, and Sangara countries.

He stated that the gold in Bouré * is almost inexhaustible, but that Bouré is not the only region where gold exists—that there is an abundance of gold not far from his own country, Soolima, not yet made available for trade on account of wars, and the, at present, inaccessible wildernesses through which it must be approached. We may reasonably conclude, therefore, that at any time some new gold-field may be opened, equal or superior to those of Bouré, and nearer to Sierra Leone, whereby an impetus will be given to the commerce of the Colony unknown in its previous history.

It is of great importance, then, to the interests of trade, that so able, intelligent, and well-disposed a ruler as the King of Falaba, should have the liberal support of the Government of Sierra Leone in his efforts to suppress those influences in the country which interfere with the safety of the road.

The Soolima country, of which Falaba is the capital, presents a very different aspect from that of the country I have described above. The villages are in better order and nearer together. The towns are larger, and the farms are extensive and more carefully cultivated. The people seem well fed, well clad, contented, and happy—the objects of envy to their Limba neighbours on the one hand, and the nomadic and impoverished Hooboos on the other.

The Soolima people might even be much better off than they are, but in the absence of a convenient market for their produce, when once they have secured a subsistence, there is little inducement to labour left. If there were a demand for the surplus produce of their farms, Soolima would be a wealthy agricultural country.

The scenery in the Soolima country is, in various parts, singularly picturesque, consisting, for the most part, of extensive and fertile plains. In one direction

* *Lying north of* Falaba, between it and Timbo.

are seen lofty and precipitous rocks, destitute of vegetation; sometimes isolated peaks or cones of granitic formation, rising to the height of 2000 or 3000 feet; in another, abrupt timbered hills often with dome-like or pyramidal summits of granite, which, owing probably to the droppings of innumerable birds, present a white appearance, and glitter in the sunshine like the snow-capped peak of Teneriffe. In another direction are seen gentle slopes covered with tall grass or moderate-sized trees. On one of these slopes stands the town of Falaba, surrounded by a natural stockade of over 500 huge trees (190 of which are very old), also enormous silk-cotton trees. One of the gates of the town, of which there are seven, is ingeniously cut through the trunk of one of the largest trees. The population of the town during the trading season, from December to May, cannot be less than 6000.

It is a fact of singular interest that a country, the general conception of which is that of an arid plain or wilderness of marsh and swamp, should not only present a picturesque appearance but be found to possess, in many places, great agricultural capabilities.

On the 10th of March, the Expedition left Falaba, adopting the Port Loko route, to return to the coast, and being detained two days on the way by the Chief of Big Boumba, we reached Port Loko on the 23rd, at 10 A.M. For a great portion of the way the face of the country is extremely rugged; there is a plateau or series of highlands running from the north-west to the south-east, between Caballa and Little Boumba, a distance of about 100 miles. Their total length from north to south has been estimated at 300 miles: they contain the sources of the Niger, and of most of the numerous rivers, north of the equator, which flow westward. After Caballa has been passed by the traveller going east, the land slopes gradually down into the plains of Sangara and Bouré, through which flows the Niger; so also the traveller coming west, after he has passed Little Boumba, experiences but little fatigue, for there is again a gradual sloping to the Atlantic. The source of the Niger is evidently not far south of Falaba.

After leaving Soolima, the next country on the west is Koranko. Caballa is the capital where reside Bullatemba, a powerful war-chief, friendly to the Government. The country next to Koranko, on the west, is Limba—a very extensive region. Most of the troubles, both on the Port Loko and the Kambia route, are said to owe their existence to the mischievous activity of the Limbas. A narrow strip of their country extends north of the Port Loko road, forming a wedge between the Soolima and Soosoo countries; and their towns in that district furnish a shelter for the Hooboos and other marauders, who, but for them, would not linger on that route. So also on the Port Loko road; they are continually waging war or committing isolated acts of plunder. Their towns are always built on difficult and scarcely accessible highlands, and protected by the cover of high forests. This is the case with the great Limba towns of Konkoba, Katimba, and Kafugu on the Port Loko road, and Kamalafi, Bafudeyah, and Lahko on the Kambia road. The Limba women ornament their heads carefully, wear abundance of ear-rings, but only a narrow strip round their waist. They are a savage and inhospitable tribe, addicted to robbery and freebooting, especially those on the Kambia route, who are in league with the Hooboos, and seem to think it their interest to stop all communication between the interior and the coast.

If the Government could bring under its influence, by yearly stipends, the powerful Limba chiefs on both routes, a great deal might be accomplished towards keeping down wars and plundering between the coast and Falaba.

The region beyond Falaba could easily be kept peaceful by the influence of King Sewa and the Mohammedan chiefs on the east, who are interested in the freedom of trade.

I beg here to remark that, next to Falaba and Caballa, Big Boumba is the *most important point* on the road. The people are brave and warlike, and

they do a great deal to keep the Hooboos in check. Notwithstanding their disappointment in not receiving their stipend last year, their temper, though not all that could be wished, is still favourable to the Government; but it is to be feared that if their money is any longer withheld, they may become reckless, and neglect the oversight of the road. And, indeed, they said that, with exhausted resources, they would be obliged to be quiet or subject themselves to the humiliation of defeat and the certainty of retaliation from their foes. But what is, perhaps, more probable is that, dreading revenge or pinched by poverty, they may unite with the robbers and become their active and influential allies; and the roads through the Limba country would then be at the mercy of five or six thousand homeless and desperate vagabonds.

I crave permission to express the opinion that, where chiefs have proved their friendship to the Government and their interest in promoting the security of the road against lawless banditti, it is not incompatible with the duty of a Government, anxious to advance the prosperity of the country and develop trade, to furnish to such chiefs all the moral and material support in its power. This appears to me to be a very different thing from harassing peaceful natives by continual police visitations and meddlesome interference in their domestic affairs.

With regard to the stipend system, I would not be understood to affirm that I regard it in its present form as a panacea for the ills which afflict the country. Some method has yet to be devised, not only for economising the distribution of stipends, but also for concentrating the authority of the Government at prominent points in the interior, in order to see that the objects for which the stipends are bestowed are carried out, and to assist enterprising and progressive chiefs to apply the physical forces, now wasted in fruitless antagonism, to the development of the resources of the country.

It is evident that the trade of Sierra Leone with the interior is as yet only in its infancy. I saw no British calicoes or muslins amongst the tribes I visited. They raise large quantities of cotton, and manufacture their own wearing apparel. Until their time becomes more valuable, English cotton goods cannot be furnished to them as cheaply as they can make their own cloth. But if the demand for Manchester prints is small, English hardware and cutlery, powder, guns, beads, and, I believe, some woollen cloths, are eagerly sought after.

Those chiefs with whom I conversed on the subject of cultivating beni-seed in lieu of ground-nuts said that it was much more convenient for them to raise ground-nuts, as they subsisted largely upon that article; and that such was the impatience of the traders for the nuts during the season, that they had no time to remove the shell before sending them to market.

The tent which I carried with the Expedition has been left at Falaba at the urgent request of the king. When it was erected in his town, persons came from all quarters to see it; and the king concluded that it ought to be left in his town as a specimen of British art, and as an indication of the friendly relations existing between Her Majesty's Government and himself.

The delays and expense necessarily incurred in traversing a new route and visiting chiefs hitherto unknown to the Government, and the consequent failure of supplies, prevented the Expedition from proceeding to the Sangara country.

In conclusion, I beg to be permitted to add, that a great and important work devolves upon the Government of Sierra Leone—a work with which the commercial prosperity of the Colony and the civilization of millions are intimately connected. England stands foremost amongst the nations as the energetic promoter of whatever concerns the welfare of the African continent. Her Colonial possessions on this coast, and her commercial and moral

ascendency, specially qualify her, through her agents resident here, to contribute largely towards rescuing the tribes accessible to her influence from their present abject condition and assisting them to take a part in the work of the world's progress.

I have the honour to be,
Your Excellency's obedient Servant,
EDWARD W. BLYDEN.

His Excellency J. POPE HENNESSY, C.M.G.,
Administrator-in-Chief, &c.

ITINERARY OF THE FALABA EXPEDITION, 1872.

Route from Kambia to Falaba.

January 20, 1872.—Left Kambia, on the south bank of the Great Scarcies River, at 10 A.M., course E.N.E.; passed through a beautiful undulating country of gravelly soil, containing extensive fields of ground-nuts. At 12.45 P.M. passed through Ro-tubon; saw a large grove of palm-trees on the left hand. We now entered a grassy region, where the soil appeared rocky, with stunted trees here and there. Near the path, on the right, flowed the Great Scarcies River from east to west.

At 1.45 P.M. reached Laminayah, a small village surrounded by orange, lime, and mango trees. We left at 2.35, passed through Kankobramyah at 3.35, and reached Basia at 5, a flourishing Muslim town, surrounded by a substantial mud wall.

Jan. 21.—Left Basia at 10.15 A.M.; passed through Sulimanyah, a thriving village, at 10.55; reached Siakeyah at 11.25; left at 12, and reached Kuwebramayah at 12.30 P.M. Left Kuwebramayah at 12.45, and reached Bolon at 2.

Jan. 22.—Left Bolon at 6 A.M., reached Kasikondie at 7.25, a village embowered in plantain and banana trees; at 8.45 reached Kukuna.

Jan. 28.—Left Kukuna at 10.15 A.M., course north-east; at 11 passed some very pure iron-ore; at 11 30 reached a creek near which we saw several furnaces for smelting iron. At 12.20 P.M. reached Berehurí, a village situated on a very high hill; after resting a few minutes, we reached Bugami at 1.30, where we rested for the night.

Jan. 29.—Left Bugami at 6.30 A.M.; at 6.50 entered an extensive prairie region, and reached Kufuna at 12. This region abounds in iron-ore.

Jan. 30.—Left Kufuna at 5.55 A.M., crossed the Great Scarcies River near the town, course east, and reached Ganjah at 8 P.M.

Jan. 31.—Left Ganjah at 12 A.M., course E.N.E.; left the Great Scarcies River on the left hand; at 1.50 P.M. reached the village of Salliyah; left at 2.35, passed through prairie lands of deep black mould; at 3 passed over a hill entirely bare of vegetation, composed principally of a greyish granite; at 3·35 reached the village of Korokoro, where we rested for the night.

February 1.—Left Korokoro at 10.30 A.M., course E.S.E. then north-east; reached Firighia, a village on a hill, at 12.40 P.M.; left at 1.50, and reached *Sumata* at 3.

Feb. 2.—Left Sumata at 6 A.M., course south-east; at 7 saw very high mountains to the north. At 7.30 reached Dramanyah, left there at 8, passed through Sumbarayah at 8.35; at 9 reached Koto, situated about two miles north-west of the Little Scarcies. Left Koto at 12.20 P.M.; at 12.45 reached Little Scarcies River, crossed in a canoe. Left the river at 1.20, and reached the Yimbereh at 1.40.

Feb. 5.—Left Yimbereh at 8 A.M., course east; reached Dubayah at 11.40. *Here we were in the midst* of picturesque mountain scenery.

Feb. 11.—Left Dubayah at 6 A.M.; reached Kabayah at 7.40; course S.S.E. Region mountainous.

Feb. 12.—Left Kabayah at 6 A.M.; reached another branch of the Little Scarcies River at 6.30, crossed in canoe. Left the river at 7.10, and, after a hard travel through a dreary wilderness, reached a miserable hamlet, called Kowina, at 12. We now entered the Limba district.

Feb. 13.—Left the hamlet Kowina at 6 A.M., passed through wild, but beautiful scenery, and reached Kamalafi at 7·10.

Feb. 17.—Left Kamalafi at 2 P.M.; reached Kamakoomba at 4.30.

Feb. 20.—Left Kamakoomba at 6 A.M.; passed over very high hills, reached Bafudeyah at 9.50.

Feb. 22.—Left Bafudeyah at 6 A.M., course north-east; reached Lâkoh at 10.30, a mountain village.

Feb. 23.—Left Lâkoh at 6 A.M., and reached Finamusayah at 9·20. Here we entered the Soolima country.

Feb. 26.—Left Finamusayah at 5·45 A.M.; reached Soghoreia at 7·10; course east. Left Soghoreia at 7.40, passed Numula at 9.10, and reached Bintia at 11.50.

Feb. 27.—Left Bintia at 4 A.M.; reached *Falaba* at 8 A.M. The carriers with the baggage did not arrive until March 1st.

Return Route from Falaba to Port Loko.

March 10.—Left Falaba at 8.30 A.M.; at 9 passed a high hill of solid granite; reached the king's cattle-farm at 9.40, left at 10; arrived at Tade-sodo's town at 11.15; stopped for the night.

March 11.—Left Tade-sodo's at 6 A.M.; reached Sonkonyah at 7.35. Left Sonkonyah at 8.10, reached Numulu at 11.30, stopped for the night.

March 12.—Left Numulu at 5.30 A.M.; at 5.45 crossed a rapid stream, about 15 yards wide and 2 feet deep, flowing E.N.E., evidently one of the small tributaries of the Jaliba or Niger. At 7.15 passed the village Melacoro, and reached Caballa, the capital of the Koranko country at 9.30.

March 13.—Left Caballa at 6.35 A.M., and reached Konkoba situated on the summit of a precipitous hill, at 12.

March 14.—Left Konkoba at 5.20 A.M.; reached Kafugu at 10.30, road exceedingly rugged and difficult.

March 15.—Left Kafugu at 5.30 A.M., and reached Katimbo at 7.30.

March 16.—Left Katimbo at 5.15 A.M., and reached the town of Kawona at 12.

March 17.—Left Kawona at 5.30 A.M., and reached Big Boumba at 9. Here a messenger from Governor Hennessy met the Expedition with a communication expressing deep interest in the fate of Dr. Livingstone, and authorising me to proceed, at an additional expense, further into the interior to make inquiries as to the great traveller;* but, being entirely out of supplies, I thought it prudent to keep on towards the coast.

March 19.—Left Big Boumba at 8.15 A.M., and reached Little Boumba at 11.

March 20.—This morning detained by the chiefs of Little Boumba until 8 A.M., when we left, crossed the Little Scarcies at 9, and reached Bunya's town, at 1.15 P.M.

March 21.—Left Bunya's town at 5 A.M., and reached Bokarilli's town at 8.40. Having rested here until 1.30 P.M., we left and crossed the Little Scarcies at 2 o'clock, and reached Mobanta at 6.30.

March 22.—Left Mobanta at 5.15 A.M., reached Benkia at 5.10 P.M., having rested four hours on the way.

March 23.—Left Benkia at 5.45 A.M., and arrived at Port Loko at 9.30.

* See Appendix.

APPENDIX.

DR. LIVINGSTONE.

In a letter to me dated Sierra Leone, March 6, 1872, the Acting Governor-in-Chief called my attention to the fact that Her Majesty's Government were interested in the fate of Dr. Livingstone, and he gave me instructions to the effect that, when I reached the furthest point of my journey to the interior, I was to despatch messengers still further inwards to obtain information, if possible, respecting him.

The news that the principal British Authority in West Africa had offered a reward for any tidings of the great traveller was soon known along the Coast, and, on the 21st of March, Dr. Livingstone's brother addressed the following letter to the Governor:—

Mr. Charles Livingstone *to* Governor Pope Hennessy.

"Dear Sir, "S.S. *Volta*, Sierra Leone, March 21, 1872.

"Will your Excellency permit me to express my deep gratitude for your considerate kindness in offering a reward for any certain information from the interior regarding my brother, Doctor Livingstone? I have unshaken confidence that he will soon emerge from the darkness of the past few years.

"His last letter, of 1869, written on borrowed paper, requesting the 'Nautical Almanac' for 1871, shows that he anticipated being in an undiscovered country last year, probably at the Western Lake that he heard of, which may be the source of the Congo. Should he find it then easier to come down the Congo, he will touch here on his way home, and, I am sure, have great pleasure in thanking your Excellency in person.

"With much gratitude, I remain

"Your Excellency's obedient Servant,

(Signed) "Charles Livingstone,

"H.B.M. Consul."

Governor Pope Hennessy *to* Consul Livingstone.

"Government House, Sierra Leone,

"Dear Mr. Livingstone, 21st March, 1872.

"I have the honour to acknowledge the receipt of your note of to-day's date.

"As it is impossible to say in what direction your brother may work his way from the interior, it seemed to me desirable to try every reasonable chance of meeting him; and I, therefore, despatched a messenger to Professor Blyden, who is now proceeding almost due east, asking him to send on messengers from the most easterly point of his Expedition to glean information about your brother.

"I shall also request Mr. Ussher and Mr. Glover to avail themselves of any similar opportunities of communicating to the interior tribes the wishes of Her Majesty's Government on this subject.

"If, as you surmise, he may possibly touch here on his way home, I shall have much pleasure in placing my Steam Yacht at his disposal to convey him safely to Southampton.

"Believe me, yours faithfully,

(Signed) "J. Pope Hennessy."

It will thus be seen that the British Government in West Africa was moving in this matter before the Livingstone Search Expedition of the Royal Geographical Society had reached Zanzibar. Mr. Charles Livingstone's letter, *thanking the Colonial* Government, was written more than a month before

Lieutenants Dawson and Henn crossed the mainland on the East Coast. We now know that Mr. Stanley himself had contemplated the possibility of Dr. Livingstone's pushing on for the West Coast; and the surmise thrown out by Mr. Charles Livingstone on the 21st of March (long before the world knew of the great explorer's safety) that his brother might yet work his way down the Congo has recently received the authority of Captain Burton, who suggests an Expedition from the West Coast to meet him.

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2. *On the Rivers Mukah and Oyah in Borneo.* By Lieutenant C. C. De Crespigny, R.N., F.R.G.S.

I have been up to Mount Ular Bulu, in search of cinnabar, but found no indications of it, or of any other metal. On the way up the Mukah I stopped at Lelac, where are the remains of a long Milanow-house. The iron-wood posts are still standing, although great forest trees have grown about and among them. Menjanei, one of my Milanow chiefs, who was with me, said that his great-great-grandfather, named Bugud, was the chief of Lelac, and, in consequence of the inconstancy of his wife, he called in the aid of the Kyans and destroyed the place, and all his own people who happened to be at home. The ruins are 96 fathoms in length. The rivers Mukah and Oyah being under my jurisdiction, I hold Court at various Dyak villages. I crossed over to the Oyah River, and at Aniow's house sent for the Pakattan chief Suni. Two years ago the Pakattans built some houses just below Aniow's Dyaks, but getting heavily in debt to the Dyaks, they had shown a disposition to flit. I promised Suni that, if he would leave his wandering habits and live in houses like other people, I would supply him with seed-cocoanuts and other seeds. He promised upon this to bring his people together to the houses they had formerly built.

The Pakattans are an interesting tribe. Although they lead a wandering life in the forests, and do not live in houses, they are by no means the savages one would infer from that fact, although the Dyaks treat them with pity and a little contempt. They tattoo themselves from head to foot in the most beautiful manner. They live almost entirely by the chase. Latterly they have sown padi here and there among the Dyak clearings, but, having sown it, go away into the jungle, and at harvest-time are content to take what the deer and pigs have left them. Their language is quite different to Malay, Dyak, or Kyan, and sounds very much like Tamil. Can they be a remnant of people from India? Although they are wanderers they have their possessions, consisting of gongs and jars, which they stow away in the hills. I am sorry I was so short a time amongst them, that I can give you at present no further information concerning them. As, however, the Pakattans are under my protection, I hope to see and know more of them soon.

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3. *The Rationale of an Open Sea in the North Polar Region, considered with reference to analogous developments during winter in the Interior Lakes of North America.* By Alexander C. Anderson, Esq.

After a very long interval I resume the consideration of a subject referred to in a Paper which I had the honour of submitting to the Society as far back as the year 1844. I do this, after prolonged experience, under the impression that from the premises advanced, more extended inferences may be deduced; and with the trust that the conclusions at which I profess to arrive, will not be without their interest to the student of physical geography.

To avoid repetition, I, as a preliminary step, invite attention to the tenor of my former Paper;* but for convenience' sake I will quote the special passage to which the succeeding remarks will more particularly apply.

"The open spaces occurring upon the frozen surfaces of rivers, are by the Canadian voyagers called *Mares;* a name applied likewise to another variety of these openings, whose origin is in reality very different, though upon superficial observation they are apt to be confounded. The latter variety is generally, I ought perhaps to say invariably, met with at the outlet of lakes, or at the spot where a tributary enters; and frequently in deep streams, whose current flows sluggishly, and other positions where the inducing causes similarly prevail. Subaqueous springs are in these cases the obvious source. These *mares*, or pools, though perfectly quiescent, are not affected by the most intense cold, if we except that their dimensions are somewhat contracted upon its prolonged continuance; but with the relaxation of the cold they quickly recover their original dimensions.† . . . . In the Rocky Mountains, from Lat. 50° to 55°, where the mean annual temperature is comparatively low, these conditions are even more conspicuous than in more genial positions lying at a lower level; and in crossing these mountains by the passes between the heads of the Athabasca and Fraser rivers, at different times from October to February of several years, I have witnessed the *mares* in their usual condition, whether under the influence of the early frosts, or when subjected to the intense cold of mid-winter."‡

To convey the apprehension of the nature and conditions of these *mares* more definitely to the reader, I will describe one; and for this purpose I select that at the discharge of the Nâh-cal, or Stuart's Lake, ordinarily styled Nâcauslay. This lake, in length about 75 miles, with a breadth varying from 3 to 5, is situated in British Columbia, its outlet being in Lat. 54° 26′, Long. 124° 30′ w., its waters thence flowing to Fraser River by the Stuart Branch. The general depth of the lake—confined as it is in most parts by steep mountainous shores—is great; ranging, perhaps, from 50 to 75 fathoms or more; but at the outlet it becomes shallow, the depth there, in winter, not exceeding some 10 or 12 feet. The first severe cold in December serves to cover the lake with ice, save only the *mares* or vacancies referred to. That at the outlet, to which I more particularly confine myself, has an approximate extent within the lake, varying from 500 to 700 acres, according to the circumstances of the weather; the open water continuing afterwards for some distance down the discharging stream. So soon as the severe weather relaxes, by which the *mare* may have been contracted to its narrowest limits, a gradual enlargement commences, caused evidently by the flux towards the outlet of water issuing from springs seated within the depths of the lake, and consequently of a mean temperature considerably above the freezing-point. The product of these hidden springs, as compared with the amount discharged at the outlet, may be assumed to be equal to the complement of the quantity emitted from the several tributaries, the pressure of the accumulating snow on

* Article on the "Freezing of Streams, &c., in North America," 'Journal of the Royal Geographical Society,' vol. xv., 1845.

† P.S. 1869. By *cold* in this passage is intended the ordinary winter's temperature of the western verge of the Rocky Mountains in lat. 54° or 55°, in the vicinity of Fahrenheit's Zero. By *severe cold*, the occasionally recurring intervals when the thermometer may range from − 20° to − 35°, or − 40° of the same scale.

‡ P.S. 1869. Instance the following. Traversing the range on snowshoes in January, 1836 by the Tête Jaune Pass (sometimes recently called the Milton and Cheadle Pass) there were extensive *mares* both in Cowdung and Moose Lakes, as well as on the issuing branch of Fraser River. Upon the river lower down, within the limit of canoe navigation, there were numerous similar vacancies in the ice, some of them several miles in length, originating from springs, partly, but *chiefly from unequal* stoppage of the autumnal drift.

the ice being allowed for; since hence alone could the waters of the lake be maintained at their mean winter level. As spring advances, the *mare* rapidly increases in dimensions, eroding the ice on all sides: but it is only early in May that the final disruption of the main body takes place, under the influence of the wind acting on its weakened surface.

It suffices for my purpose to confine the description to this *mare* at the outlet of the Nâh-cal: the corresponding vacancies which occur at the mouths of the tributary streams, if individually of smaller dimensions, may, with some variation of circumstance, be accounted for on principles essentially similar. We are next, however, to consider that this particular lake is only one out of a thousand or more, each under the like conditions, which stud this portion of British Columbia, pre-eminently a land of lakes. Most of these sheets of water are, of course, much inferior in size to the Nâh-cal; but two, at least, are larger. If, then, we consider the amount of the *mares* dispersed throughout, an area of open water may be conceived of, in the aggregate, of enormous magnitude.

Dispersed as they are over a wide space, it cannot be asserted that these isolated *mares* exercise any very perceptible influence on their adjacent borders; but were it permitted to suppose them collected in one uninterrupted body, it is obvious that an appreciable effect must then be produced upon the climate of the immediate environs. As it is they are generally frequented by a few solitary water-fowl, whose ordinary migration may have been interrupted; and occasionally a belated flock of swans, as I have witnessed in the *mare* at the outlet of the Nautlay, or Fraser's Lake, avail themselves of them as a refuge for the winter—their condition, when sometimes shot during the winter or early spring, evidencing abundant fare, accessible within the shallows during their hybernation.

Having, I trust, conveyed to the reader a notion sufficiently accurate of the nature of these *mares*—these miniature *polynias*, if I may be permitted to employ a term of analogous signification which has recently become familiar—I proceed to the inferences which, from analogy of circumstances, may thence, I conceive, be deduced. It is needless to specify the evidence that has been advanced to show that in the Arctic circumpolar region, at least at a certain season, a vast tract of open water exists. This inter-glacial sea was, I believe, first spoken of in 1806 by the Chevalier Giesecke, upon the report of the natives of Greenland—a source of information in matters purely geographical, locally applied, worthy, as my own experience in other quarters teaches me, of the highest confidence. Suffice it, however, to say, that the experience of Baron Wrangel on the north-east coast of Siberia, of Parry, Ross, and other navigators, goes far in proof; whilst more recently the observations of Dr. Kane not only confirm the previous conclusions, but show that the evidences of a more genial temperature were manifested as he approached the Polar confines.

A glance at a map shows at once the peculiar conformation of the Polar Basin. Surrounded nearly by land, it receives the northern drainage of three great continents, the efflux of many large rivers flowing from the southward, and all converging towards the Pole. I propose, then, to consider this portion of the globe as a vast marine lake, largely interrupted, possibly, by islands, but bearing the same general relation to the surrounding continents as an inland lake to its immediate environs: subject to the same general laws, and influenced on a grander scale by similar causes.

A vast superfluity of water, generated under temperatures of comparative mildness, is thus constantly issuing within the confined area of the Polar Sea; and hence, as has been sufficiently proved by the remarkable experience of Parry and others, the constant efflux by the several passages which connect it with the broad equatorial oceans; and which passages, for the purposes of my argument, I propose to consider as so many marine rivers, flowing towards their several receptacles. By these, analogously with their inland types, the

accumulation of ice is drifted, as from a common centre; and hence may be inferred, by the like analogy, the vast accumulation that takes place upon the verge of the lines of transit.

I have adverted only to the great supply of water ejected from the various rivers discharging within the Polar Sea—the superficial drainage of its confining continents.* But there are other sources of supply, less obvious, but no less surely existing. The agency of deep-seated springs, producing special and well-defined effects, has been noticed in the consideration of the interior lakes. But beneath the subterranean currents thus intercepted and finding exit, we may conceive of other currents, and again of others interlying the successive strata; the existence of some revealed to us by the process of boring for the Artesian well, while others flow at a depth beyond the ken of human ingenuity. Such remote currents, save where some flaw in the upper stratum may permit a partial exit at particular points, can have their final exit only beneath the ocean-bed, at distances varying with the obliquity of the shore, and the consequent distance to which the confining strata may proceed before they are disrupted. A series of subterranean rivers, interleaved as it were between successive strata, and discharging beneath the sea at various distances, may be assumed to exist, issuing in the ocean-bed at all points where there is a continent to supply them. That the numberless submarine springs hence originating exercise, in their general relation with the ocean, important physical agencies, may not be doubted. With these at large, however, I have not to deal. I confine myself to those special effects which, from analogy, they may be assumed to produce, concentrated within a restricted area such as that under consideration. These effects I conclude to be very powerful: I infer so from the analogous effects elsewhere. Thus, if we estimate the amount of water within the limited confines of British Columbia, kept permanently open, in many parts under the severest cold, at some hundreds of square miles, as I believe we may justly do, it is permissible to suppose that the like causes, operating on a grander scale within the area of the Polar Basin, may there produce results of proportional magnitude. In brief, I assume that the inter-glacial sea of the Arctic region is simply the development on a vastly magnified scale of the lacustrine *mare*—formed like it, and like it permanently free from ice.

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* The water of ice-bound rivers, maintained at certain temperatures by frequent springs, is not materially affected by superficial cold. The thick coating of snow effectually prevents rapid radiation. Beneath it, when of sufficient thickness, the temperature of the icy surface never descends below the limit of congelation. This is proved by the fact that when the water rises above the ice, exuding through unseen fissures on its depression by a heavy fall of snow, the thin sheet of water so forced above the surface is protected from freezing by the superincumbent mass, however severe the cold. Disagreeable consequences to the traveller, whether by lake or river, hence ensue when he crosses a tract thus partially inundated. Sinking beneath the treacherous surface, the wetted snow-shoe and moccassin become almost instantaneously coated with ice on their withdrawal, adding greatly to the fatigue of progress, and occasionally necessitating the changing of the inner *chaussure*, to avoid the penalty of frost-bite. In river *mares*, when the rapid current renews incessantly the emission of the comparatively warm water, its higher temperature is notably exemplified. A thin vapour arises, condensing and becoming rapidly crystallized. The borders of the *mare*, for some feet in breadth invariably devoid of snow, are covered with the shower of crystals then formed as with a beautiful efflorescence. It is probable that under the process of rapid crystallization referred to, a feeble thermo-electric current is established, since the delicate columns, glancing in the light, exhibit peculiar action, less vivid, because possibly elicited under less active force in a denser medium, but not dissimilar in effect from the play of the Aurora. These effects increase in *intensity with* the increase of cold; nor is it improbable that they bear analogy to *the phenomena of* the true Aurora, since it is noticeable that the deposition of *crystals, in the form* of hoar-frost, frequently accompany that eccentric display.

It is needless to dwell on the many proofs that show the very considerable temperature which the deep-seated currents referred to acquire on their passage seaward. The observations of Baer, Erman, and others, and the direct evidence afforded on the sinking of a well at Yakutzk, of which some notes have been published,* show satisfactorily that even beneath the frozen soil of Siberia, variously estimated as extending from 350 to 600 feet in depth, a warm temperature exists, increasing gradually with the descent. Were other evidence wanting, the high temperature of springs liberated by boring might be cited. We are justified, then, in assuming that a powerful influence is exercised on the discharge of these subterranean rivers, exemplified in their effect on the interior waters; but the ultimate effect of which must be manifestly enhanced through the absorption of terrestrial heat, as the course of these streams is prolonged towards the ocean. The origin of these hidden currents may be a matter of conjecture; but, added to other sources pervading the broad surface of the land, it is reasonable to suppose that, in the deep beds of many of the interior lakes, fissures may exist through which the redundant waters are emitted, besides the more obvious outlets—following the same general line of passage, occasionally finding partial issue within the bed of the superficial stream, and discharging eventually at the disruption of the confining strata.

In the paper previously referred to I alluded casually to the influence exercised by the inland *mares*, in their relation to certain classes of the animal kingdom. I am sensible that, in an argument that should be purely inductive from established premises, the consideration of ulterior effects should not be allowed to enter. Nevertheless I am tempted, at least in collateral support, to advert passingly to the importance of this natural provision, indispensable to the inhabitants of the interior waters, and of the various animals that thence derive their subsistence. Extending the analogy, we may infer that a provision there so obviously important, has not been denied to the innumerable warm-blooded animals frequenting the broad waters of the northern regions. Thus we may conceive that a vast nursery may there exist for those varieties of the whale whose breeding-places are yet a mystery; and that within the impenetrable boundary of ice a space exists, free from impediment, and abounding with the food proper for their support, and that of the various amphibious animals of the North. I advance this supposition incidentally; yet, while doing so, I feel that, reflecting on the consistency of the provisions of Nature in all her operations, the consideration is not without its weight.

From all the premises, and without reference to the positive evidence that has been produced, it may, I opine, be safely predicated that, within the Arctic limits, a vacancy exists, similar in its nature to the lacustrine *mare*, but on a scale immeasurably more grand. But while, as I conceive, this natural condition may be predicated with regard to the Arctic region, there is no ground to infer that a similar condition exists at the opposite Pole. On the contrary, a conclusion the reverse of this may be argued. There are there no surrounding continents whence the efficient causes should emanate. An ice-bound tract of land, so far as observation has shown, at best exists there; and if, as is to be presumed, partial vacancies in the ice may occur, they are ascribable to other causes than those prevailing ones to which I have alluded; and, among the rest, perhaps, to some extent, to the influence of volcanic action, there, as it seems, largely manifested. This view is sustained by the established fact that, in the higher regions of the south, a lower mean temperature is observable. An ice-bound pole there exerts its refrigerating influence on the surrounding climates; while, conversely, at the antipodes the concurrence of active causes sheds a modifying influence around.

In the consideration of this subject I have attached no weight to the inces-

* 'Athenæum,' No. 540, March, 1838.

sant solar influence during the height of summer. Great as this must be, notwithstanding the obliquity of the sun's rays, the effect must be comparatively insignificant. The grand effects produced must be assigned altogether to causes of a more recondite nature: and the nature of these causes I trust that my previous explanations will tend, at least partially, to elucidate. With the prevalence of these causes I conceive of no cold, even under the long duration of an arctic winter, adequate to overcome their unceasing influence; and, while travelling in bygone days under the frigid winters of the interior, and there witnessing the effect produced, I had long ago imagined the possibility of a similar development, on a more magnificent scale, within the Polar confines. The evidence constantly afforded by the observations of Arctic adventurers, all pointing in the same direction, tends directly to support the conclusion, and to sustain a theory that, abstractedly, and irrespective of the premises on which it is based, might seem vague and untenable.

In fine, I briefly sum the conclusions at which, under the view of the question which I have taken, I conceive myself justified in arriving. 1st. That there exists around the Arctic Pole a tract of open water, surrounded by a vast and apparently impenetrable barrier of accumulated ice, precluding access in the ordinary way. That this open water or "Polynia," interrupted, possibly, by islands, extends probably to the very limits of the Pole, as has by others been conjectured; and that, under constantly operating influences, it is maintained permanently free from ice. 2nd. That this inter-glacial sea, radiating heat through the constant accession of warm supplies, generates a mean climatic temperature, increasing towards the Pole, probably with the remoteness from the barrier that environs it—an inference derived from the positive observation of Dr. Kane before referred to, itself confirmatory of the earlier experience of the Russian navigator Pachtussoff.* Hence it may be inferred that, if the immediate vicinity of the Pole do not present a condition positively genial, its climate, tempered by the circumfluent waters, is at least comparatively mild. Conjecturally I add that this wide area of open water probably abounds with varieties of the cetaceous tribe, there enjoying unmolested rest and abundant food; its shores the resort of walruses and other phocidæ, and, possibly, frequented by branches of the Samoïedic race. Whether the enterprise of civilised man, actuated by the spirit of commercial gain, will ever penetrate these secluded regions to a useful end, may be fairly questioned; but we may reasonably hope that the no less active spirit of scientific research, so often hitherto frustrated, will, ere long—and that, as it seems to me, by no very arduous or deterrent process—solve a problem which, whatever the rational anticipations that may inferentially be indulged in, must till then remain shrouded, as now, in mystery and conjecture.

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4. *Notes on the Climate of the Marañon.* By Francis L. Galt, M.D.

It will be seen from an examination of the position of the village of Iquitos that this place is somewhat centrally situated as regards the valley of that portion of the Amazon which passes through the lowlands of Peru, and which is known as the Marañon.

* 'Athenæum,' No. 535, January, 1838, Art. "Russian North-Polar Expeditions." Pachtussoff's observations comprise two series, each extending through more than a year (1832-3 and 1834-5) conducted with scrupulous care at intervals of two hours throughout the whole period. The first series establishes the mean temperature of the south-eastern end of Novaïa Semlia at 15° of Fahrenheit; the second, that of a point on the western coast of the same island, two-and-a-half degrees farther north, at 16° 9′. The attempt was made at the time to reconcile the anomaly by reference to purely local causes; but the corroborative evidence *of Dr. Kane*, derived from a widely different position, leads directly to a more *general conclusion.*

The year, as regards seasons is divided distinctly into two portions—the wet and the dry. The first begins about the first or middle of November, and lasts up to June, occasionally later or earlier at either terminus. The largest amount of rainfall being about February and March generally. The prevailing winds at this time are the north-west, though all breezes are more variable than during the dry season. The rise of water in the Marañon is about 30 feet; at varying intervals of four to six years an unusual rise is expected.

The dry season continues from about the middle of June to November. The winds then are more regular, and are those which produce the greatest depression of the mercury—the south-east; they are also accompanied by frequent storms, which come up after some five or six days of dry and very hot weather. About the last of June there has always been noticed an unusually cold spell with these south-east winds, known here as the invierno de San Juan, occurring usually about the 24th, the anniversary of that Saint's festival. This past June there was, however, nothing of the sort, and during the last year, 1871, this cold spell came in July. Though the depression of the mercury was only some 9° from the average, the sense of chilliness was severely felt by the natives, and notably so by the foreign residents—it being a notorious fact that in the tropics very slight depressions make a sensible chilliness which would not be remarked in our colder latitudes. With the depression of the thermometer during the south-east winds, there is a rise always in the barometer. And in the wet season, with the warm north-west winds, there is a corresponding depression in the barometer. Passing storms make little and very variable impression on the height of the mercurial column in this region. With the dryness of the season, from July to October, the beauty of the starlight and clearness of the atmosphere is complete, and the temperature of the early mornings and at night is most delightful. Fogs are to be noticed during July, August, and September; but they disappear always about 8 or 9 A.M., and come up from the south about 10 P.M.

The greatest amount of rainfall in the past year embraced in the accompanying Table during the twenty-four hours was 4·66 inches. At no time of the year are the nights disagreeable on account of temperature; the suffocating heats felt in the drier tropical countries are unknown here, and during the dry season nothing could be more attractive than the evenings and mornings.

Observations of the Table will show the slight range of the thermometer during the year; and the great humidity still further appears to act as a promotive of comfort, by obviating the great dryness of surface caused by excessive evaporation and consequent discomfort in bodily feelings.

There are, of course, some unimportant deviations from one year to another, as regards seasons. Last year was peculiarly noted for long spells of very hot weather during the dry season, the past June has been equally remarked for the extraordinary amount of rainfall, and this year also the cold spell, "siempo de San Juan," has not made its appearance. The Marañon River, this dry season, has also been lower than has ever been known in the memory of the oldest residents of this valley.

The great uniformity of temperature and relative humidity of the air in the Marañon Valley contribute notably to the condition of health, which is most unusually good for a tropical site. The diseases of a malarial character, which are those among the most commonly found in such lowland regions as this, are remarkably tractable. Complaints of the liver and dysentery are rare or easily managed, and present none of the unfavourable features which characterize those complaints as found in the British East Indies. Even the greatest exposure here is followed but rarely by bad effects, and the slightest prudence is sufficient to enable the native or the stranger to enjoy very good health. The disorders most noticed by the medical man are catarrhal affections and rheumatisms, occurring about the change of seasons; especially

at the close of the wet season. In fact, all through the dry season, and particularly at the close of this portion of the year, the intermittent forms of fevers are most prevalent. Skin affections among all classes of the Indian and half-breed castes, leucorrhœa among the women, and dirt-eating among the children, are the most troublesome and frequent forms of deranged health to be noticed by the physician. The English who come to this region, after being here a few weeks, generally are much annoyed by boils, abscesses, and temporary derangements of the digestive system, resulting, however, in great part from a want of personal prudence in diet and drink.

Acute and violent forms of any disease are rare amongst the native populations, whether Indian or half-caste; and, in fact, most complaints are to be ascribed to a want of variety and goodness of alimentation, united with the greatest indifference as to taking care of personal comfort, and as regards exposure to rains, &c. Cloth clothing here is as much worn as lighter dress, and with comfort during the whole year, when a person is not engaged in hard physical labour; and sometimes during the chilly spells of the dry season, with the south-east winds, it is absolutely necessary for a few days —this resulting not so much from a great depression of temperature as from a sensitiveness to change which one acquires after a short residence in this intertropical valley.

I ascribe the somewhat unusual healthiness of this region to several causes:—the density of forest growth, not allowing the sun to penetrate to the earth to dry the soil, which keeps vegetation at a temperature below that necessary to disengage malarial action; to the washings of the soil by the high waters of the rainy season, acting as a sort of scavenger to the standing pools, which are thereby cleansed; to the great humidity, which acts as a modifier of the amount of transpiration from the bodily surface, thereby preventing the sudden impression of change of temperature on a too dry superficies of the body; and the small range of temperature for the year, which at the greatest does not amount to more than some 9°, and that extreme is included in some two or three days of the dry season about June.

Notes on the Weather.

Nov. 1st. 1871. Warm and very damp. Wind north-east.

2nd. Rain before daylight. Thunder at 7 A.M. Heavy clouds to south-east no rain storm from north-east at 7 P.M. Passed over Iquitos at 8.

3rd. Heavy thunder during the night. Early morning cloudy, chilly, with south-east breeze. Cleared off partially at meridian. Afternoon and evening clear and warm.

4th. Early morning overcast. South-east breeze. Fog. Damp, noon cloudy and warm, light north-east breeze. Afternoon and evening warm, overcast, north-west breeze.

5th. Morning warm, partly overcast, north-west breeze. Noon cloudy, heavy thunder in south-east. Evening warm.

6th. Early morning foggy, chilly. Noon cloudy, heavy clouds in north-east, breeze from south-east, squall from south-east. Rain at 10 P.M., with light north-east breeze.

7th. Early morning overcast—light airs. Shower at 11·30 A.M. Noon bright. 2 P.M. heavy rain. Thunder-storm from south-east in afternoon. Heavy rain at night with thunder, 3·66 inches rain in twenty-four hours.

8th. Early morning cloudy, damp, light rain and airs. Noon, wind from east. Afternoon cloudy, mist, pleasant north-east breeze. Evening light, starlight.

9th. Early morning overcast—temperature pleasant, north-east breeze. Day overcast, pleasant north-east breeze. Evening partially overcast. Mid-*night bright and clear.*

10th. Early morning partly overcast—light airs. Forenoon same, with west breeze. Heavy storm from south and west at 4 P.M. Rain all the evening, thunder and lightning.

11th. Early morning pleasantly cool, overcast, light north airs. Noon and afternoon light, with fresh north-west breeze. Evening, bright starlight, light airs—midnight bright and clear.

12th. Early morning, bright, clear, with fresh north-west breezes—light fog before sunrise. Day bright, clear, with north-west breezes fresh. Evening occasionally overcast, midnight clear.

13th. Early morning partially overcast, light airs. Heavy clouds, and wind from north-east at 10 A.M. Heavy rain at 1·30 P.M. from north-west. Afternoon overcast, chilly breeze from south-east. Evening partially overcast. Midnight clear.

14th. Early morning partly overcast. Day pleasant, with light north breezes. Evening, heavy clouds in north, with thunder and lightning. Rain with north-east breeze about 10 P.M.

15th. Early morning overcast, light south airs. Noon same, breeze from north and west. Afternoon pleasant and partly overcast. Evening pleasant, partly overcast. Midnight bright and clear.

16th. Early morning overcast—light airs. Light rain at 1 P.M., heavy clouds in north. Afternoon overcast, light airs. Evening overcast, pleasant light airs.

17th. Early morning overcast. Day warm and partly bright. Evening overcast. Midnight overcast.

18th. Early morning—light drizzling rain—air damp and warm, cleared up partly at 8 A.M. 2 P.M., appearance of heavy storm from north-west, passed with light rain ; evening bright, night light.

19th. Early morning bright, and clear and warm. 2 P.M., appearance of storm, passed with rain. Afternoon overcast and pleasant. Evening light moonlight. Fog at midnight.

20th. Early morning overcast, damp and warm. Day same. Evening overcast. Rain during the night. Light north-west breezes.

21st. Early morning bright, light airs. Noon light, with pleasant north breezes. Afternoon partly overcast, storm clouds in east. Light rain at 5 P.M., continuing during the evening.

22nd. Early morning overcast, light rain, breeze light from north. Day overcast, with light south airs. Evening same. Midnight, fresh east breeze.

23rd. Early morning partly overcast, light airs. Forenoon same, with light north-east breezes. 2 P.M. heavy storm to north, passed around with light rain in Iquitos. Evening and midnight bright and clear.

24th. Early morning, heavy fog, clearing off about 8 A.M. Morning bright, light airs from north-east. Afternoon same. Evening and midnight bright and clear.

25th. Early morning, bright and clear, with north-east breeze. Noon same. Light rain about 2 P.M. Afternoon bright and clear. Evening bright and clear.

26th Early morning bright and clear, with pleasant west breeze. Noon same, with north breeze. Day unusually dry. 6° difference between Thermometer and Wet Bulb. Evening bright and clear.

27th. Do. do. do.

28th. Do. do. do.

29th. Do. do. do. Breeze from north and west, more irregular than in last three days. Not so fresh.

30th. Early morning partly overcast, south-east breeze. Rain at 4 P.M. from south-east. Evening overcast.

Yearly Abstract of the Weather on the Marañon, noticed at Iquitos, Peru.

Iquitos { Lat. 3° 44′ 20″ s. / Long. 73° 07′ 40″ w. Elevation above the sea-level, 313 feet.

Date.	Average of Thermometer.	Average of Wet Bulb.	Number of Rainy Days.	Highest Record of Thermometer.	Lowest Record of Thermometer.	Highest Record of Barometer.	Lowest Record of Barometer.	Number of Inches of Rain.	Lowest Average Temperature at Night.	Remarks.
July 1871..	24·9	23·0	11	29·5	18·8	75·99	75·32	4·27	..	Observations were taken regularly every day at 9 A.M., 12 A.M., 3 P.M., and at 9 P.M.
August ,, ..	26·1	23·6	10	30·4	19·6	75·88	75·24	3·94	..	
September ,, ..	26·2	23·8	8	32·4	21·4	75·83	75·08	9·33	..	Lowest night temperature obtained with one of Negretti and Zambra's spirit, horizontal thermometers, containing a movable piece of substance in the tube, which remained at the lowest grade reached by the spirit, commenced on the 1st January, 1872.
October ,, ..	26·9	24·6	14	31·0	23·8	75·66	75·03	7·57	..	
November ,, ..	27·2	23·9	16	31·8	23·9	75·62	74·96	8·42	..	
December ,, ..	26·6	24·2	13	31·4	23·4	75·77	75·18	11·45	..	
January 1872..	26·3	25·0	19	30·6	23·8	75·73	75·14	10·23	23·2	The Barometer was put out of order on May 31st, and could no longer be made serviceable.
February ,, ..	26·7	24·8	11	31·3	22·3	75·69	75·05	9·86	23·2	
March ,, ..	25·9	24·2	19	30·4	23·2	75·74	75·08	16·00	23·3	
April ,, ..	26·3	24·3	15	31·0	21·4	75·80	74·99	8·93	23·1	
May ,, ..	25·7	23·9	19	30·2	22·0	75·93	75·16	9·99	22·9	
June ,, ..	25·0	23·4	20	29·0	21·4	..	..	11·77	22·3	The "rainy days" include all on which any rain, however slight the shower, may have fallen.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 28TH, 1873.]

SESSION 1872-73.

Eighth Meeting, 10th March, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*F. O. Adams, Esq.* (Secretary of Legation, Berlin); *Horace B. Benjamin, Esq.; Marquis de Compiègne; Rev. W. Bentinck L. Hawkins*, M.A., F.R.S.; *Charles Augustus Howell, Esq.*, F.S.A.; *J. Horsley Palmer, Esq.; Captain F. C. B. Robinson*, R.N.; *Charles Spencer Salmon, Esq.; Lieutenant William Scriven*, R.N.; *John Walker, Esq.; William N. West, Esq.; James Windram, Esq.*

PRESENTATIONS.—*J. W. Carillon, Esq.; S. G. Glanville, Esq.; Dr. J. Rambaut.*

ACCESSIONS TO THE LIBRARY FROM FEBRUARY 24TH TO MARCH 10TH, 1873.—'From Bangalore to Calcutta, &c.' By Major G. E. Bulger. Secunderabad, 1869. Donor the author. 'Reliquiæ Aquitanicæ.' Donors the Trustees of MM. E. Lartet and H. Christy. 'Die Monats- und Jahresisothermen in der Polarprojection, &c.' Von H. W. Dove. Berlin, 1864. Donor the author. 'Peters des Grossen Verdienste um die Erweiterung, &c.' Von K. E. v. Baer. St. Petersburg. Donor the author. 'Russian Occupation of the East Coast of the Caspian.' With map. By R. Michell. Donor the author. 'The Franco-German War, 1870-71.' By Capt. F. C. H. Clarke. Donors the Topograph. Dept. of the War Office. 'Hand-Book of the Manufactures and Arts of the Punjab." Vol. II. By H. Baden-Powell. Lahore, 1872. Donors the Government of the Punjab. 'Cosmos: Comunicazioni sui Progressi piu recenti e notevoli della Geografia e Scienze affini. Di Guido Cora. Torino, 1873. Donor the publisher.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF FEBRUARY 24TH, 1873.—Map of Iceland, on 4 sheets. By O. N. Olsen. Three special editions, Physical, Administrative, and Hydrographic. By purchase. Atlas of Denmark, on 20 sheets. By A. Bull. By purchase. Geological Map of the Netherlands, on 6 sheets. By Dr. W. C. H. Staring. By purchase. Map of the Netherlands, showing the lines of Telegraph, Railway, and Steamboat traffic, on 1 sheet. By purchase. Map of Java, on 1 sheet. By S. H. Serné. 1872. By purchase. Map of the Ottoman Empire in Europe and Asia. By Dr. H. Kiepert. On 4 sheets. By purchase. Plan of Berlin. By Major D. Sineck. On 4 sheets. By purchase. Atlas of the Ancient World, on 12 sheets. By Dr. H. Kiepert. By purchase. Map of Austria, ethnological. By Dr. H. Kiepert. By purchase. Map of Germany, ethnological. By Dr. H. Kiepert. By purchase. Seven Charts of the German Coast of the North Sea. Published by the Prussian Admiralty. By purchase. Chart of the Southern part of the Baltic Sea, on 4 sheets (supplementary to the above). By purchase. Wall Map of the German Empire, on 9 sheets. By Dr. H. Kiepert. By purchase. Two Maps of Elsass and Lorraine; Historical and Ethnographical. By R. Boeckh and Dr. H. Kiepert. By purchase. Map of the Isthmus of Panama. By M. A. Codazzi. By purchase. Map of the Caucasus and adjacent country. By Dr. H. Kiepert. By purchase. Map of Southern Syria, comprising the Lebanon Mountains. By Dr. H. Kiepert. By purchase. Map of the World, on Mercator's projection. By Dr. H. Kiepert. By purchase. Meyer's Hand-Atlas, containing 100 maps. By L. Ravenstein. By purchase. Map of Germany and the surrounding Countries. By L. Ravenstein. By purchase. Map of British Columbia, to the 56th parallel. By the Hon. J. W. Trutch, Chief Commissioner of Land Works and Surveyor-General, Victoria. By Purchase. A Russian Map of Turkistan, in Russian characters. By Colonel Iljin. On 2 sheets. 1872. Japanese Map of the Province of Jeddo. Presented by Ney Elias, Esq.

The following papers were then read:—

1. *Notice of a Journey in Southern Formosa.* By J. THOMSON, Esq., F.R.G.S.

[ABSTRACT.]

IN this paper the author embodied his experience of travel in the interior of the comparatively little-known island of Formosa. Takow, the principal port on the south-western side of the island, was reached on the 2nd of April, 1871. This harbour is approached through a narrow cleft in a bold ridge of rocks skirting

the shore; it is a shallow lagoon, 6 miles in length by 2 in breadth, protected from the sea by an arm of sandy soil, which joins the rocks and sweeps round to the southern extremity in a green belt of tropical foliage. It is a great drawback to the trade of the place that it is available for vessels of light draught only; but, in Mr. Thomson's opinion, it might be greatly improved by dredging operations. The rocks are of igneous formation, and built up of a number of cells, presenting a series of flint-like edges, difficult to ascend. Many of the cells contained a thin layer of sandy soil, supporting a few dwarfed shrubs and grasses, and a dwarf species of date-palm, the fruit of which never reaches maturity.

A hill, over 1000 feet in height, and known to foreigners as Ape's Hill, towers above the northern extremity of the harbour, of which a fine view may be obtained from its summit. The species of ape by which it is inhabited, has some general resemblance to the "mias," or orang-outan of Borneo. Wild mint, minor convolvulus, and a creeper with a small yellow flower, were also seen in great abundance. The village of Takow and part of the small foreign settlement are built upon the sand-belt before mentioned; the river-entrance lies to the south of the harbour, and probably at one time (prior to recent physical changes) formed an important means of communication with the interior. The chief exports are sugar, sesamum-seeds, rice, sweet potatoes, ground-nuts, lang-ngams, and turmeric. The import trade, chiefly manufactured goods, was more than trebled in 1870, as compared with 1868. This increase of trade and corresponding revenue was a proof of the rapidly-developing resources of the island.

Returning on board the steamer, Mr. Thomson, in company with Dr. Maxwell (who had previously made some excursions in the interior), left for Tai-wan-fu, a port 25 miles to the northward. The landing was effected by means of a native surf-boat or bamboo-raft, upon which is placed a wooden tub, for the accommodation of passengers; but as the tub is not attached in any way to the raft, it not unfrequently happens, when the surf runs high, that the passenger is washed ashore in it.

Fort Zelandia, now in ruins, was built by the Dutch, in 1633, on an island, to protect the inner harbour. In illustration of the great physical changes that have taken place, it is said that in 1661 the Chinese pirate, Koshinga, appeared before the town, and ran his fleet into the spacious haven between Zelandia and Provintia, which are three miles apart. The spacious haven alluded to is now an arid plain, and the water off the port so shallow, that vessels are compelled to anchor two miles out.

Tai-wan-fu, the capital of Formosa, is a walled city, some five miles in circumference, with a population of 70,000, chiefly natives of the Fokien province and Hak-kas. The town still retains some traces of the former Dutch occupation, the principal of which is the ruined fort of Provintia.

The author and Dr. Maxwell left the city on the 11th, on a visit to the Pepohoans, or half-civilized tribes of aborigines, inhabiting the hill-country nearest to the central chain of mountains. Crossing a highly-cultivated plain, they entered the hills lying at the base of the central range, which was now much more clearly discerned; it is rarely visible from the sea or western shore, being obscured either by a veil of fine dust rising from the plain, or by clouds of vapour from the land during the wet season. The hills crossed presented bare surfaces of sandy clay and limestone, with scant herbage, the heat being most intense.

The land, in some places undermined by the mountain-torrents, had fallen in, in great pits of irregular form; in others were seen dry channels, where rivers had formerly, during the wet season, forced their way. Owing to the shifting nature of the soil, the farms and dwelling-places were necessarily temporary structures. The first settlement of Pepohoans arrived at was Pao-be, 20 miles from Tai-wan-fu. In general appearance the natives resembled Malays of a superior type, their language also bearing a strong affinity to that spoken by the Malays of Singapore and Malacca.

The road to Baksa, 10 miles from Pao-be, lay through hilly country, similar to that passed through on the previous day. The ground, however, rising higher, and the hills being of more imposing character, bold crags of limestone appearing in many places, conspicuous amongst which was a huge mass, known as the "Hanging Rock of Baksa." The valley in which Baksa is situated is one of the most beautiful in the island. Some of the native porters had here a narrow escape from being bitten by three deadly-poisonous snakes of a pea-green colour, with lozenge-shaped heads.

The next day's journey further inland over broken and disturbed country, gradually increasing in elevation, proved a severe test of the powers of endurance of the Baksa villagers engaged as carriers, who in their cheerfulness and honesty contrast favourably with the Chinese coolies. Considerable inconvenience was felt from want of water, the heat of the sun having dried up all the streams; no trees offered their friendly shade, and the atmosphere was almost suffocating.

At one halting, a noxious shrub was accidentally broken by one of the party, and was found to emit a perfectly putrid odour: a

remarkable trailing vine, called "Ok-gue," was also found in this part of the island, the seed of which when dry is used for making jelly, a small quantity of the seed placed in a coarse cotton bag and allowed to soak in a cup of water, transformed the water into a nutritious jelly similar to that of calf's-foot. They now entered a valley, lying at the foot of the central chain, and could see the mountains rising range above range, and over all the peak of Mount Morrison, 11,000 feet above the sea-level. Crossing the La-ko-li River by means of a bamboo bridge, they arrived at the small settlement of Pa-ah-lian: these bridges are of most fragile construction, and require great care in crossing; they are kept in repair by the people in the neighbourhood.

The mountains along the foot of which they now passed were clad in forests of gigantic trees, forming the lower hunting-grounds of the wild Hill Pepohoans, who make occasional raids on their less savage kinsmen of the plains. The women of Pa-ah-lian bind their hair in a sort of cable which they surround with a spiral of red cloth, the whole is then wound round the head, and forms a natural diadem: tobacco smoking is indulged in by both sexes.

On the way to the village of Kasampo wild guavas and raspberries were found in great abundance, the latter equal in size to those of this country; the arrival of strangers at the last-named village was the occasion of a feast and dance, of a most animated description, by the young men and women of the place.

Being now about to enter the territory of the less friendly hill-tribes, two armed guides were obtained at Kasampo. This part of the journey presented a most grand combination of mountain, forest, and river scenery. Passing through the forest on the heights above La-lung, some fine specimens of the camphor-tree were seen, and in a space partly cleared of underwood a gigantic lily about eight feet high, having broad bending leaves and a large cone of pink and white flowers, while climbing parasitic plants passing from tree to tree formed a chaos like the confusion of ropes on a Chinese junk. From the highest point of this ridge a fine view of Mount Morrison was obtained.

On the way to La-lung, which is the nearest settlement to the habitations of the mountaineers, they met with a Pepohoan who had crossed the main range from the other side: he reported the existence of a fine harbour at the foot of Mount Morrison, unknown, he said, to foreigners.

Leaving La-lung next morning for La-ko-li, about 12 miles south, where they expected to meet with a party of savages who were there on a trading visit, the path lay along the precipitous bank

of a dry river-bed: it was impossible not to feel impressed with the magnificence and grandeur of the mountain scenery, softened and beautified as it was by the luxuriant foliage of evergreen forests. La-ko-li was reached at night, and shelter obtained, after some trouble, at a house occupied by a savage 6 feet high, his wife, and father. The water here was very alkaline, and the river-banks covered with what appeared to be crystals of soda; in the dry beds of one or two streams quantities of slate and shale, as well as indications of coal, were observed. The latter commodity will doubtless in course of time contribute greatly to the development of the trade and general progress of the island; it already forms an article of commerce in the north.

A subsequent attempt by Mr. Thomson to penetrate into the interior by a route further south was frustrated by disturbances that were taking place among the tribes. In a few remarks appended to his paper concerning the prevailing religion, the author mentioned that there were at the present time over 1000 native Christians on the island, the old religion, or fetishism, gradually dying out. The interest of the paper was greatly enhanced by the exhibition at the meeting of a large number of photographs of the scenery and inhabitants of the island, taken by Mr. Thomson during his trip.

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2. *On the Oil Rivers of West Africa.* By W. NICHOLAS THOMAS, Esq., R.N., F.R.G.S.

THE oil rivers on the West Coast of Africa may be described as one enormous delta, with the chief rivers, Benin, Niger, Brass, New Calabar, Bonny, Ossobo, Old Calabar, and Cameroons, from which is derived the enormous trade employing so many magnificent steamers on the coast of Africa, trading with Liverpool and Glasgow.

Very early on the morning of the 4th March I anchored off the mouth of the River Bonny, and at 7.30 A.M. I proceeded over the bar into the river in a small steamer, anchoring not far from the hulk of the African merchants about noon.

The English merchants who trade with the natives have wisely adopted the greatest precautions to preserve their health in this climate so dangerous to Europeans, and therefore, instead of living on shore, amidst the swamps by which the native town is surrounded, they reside in large hulks (many of them formerly large East Indiamen) moored in the centre of the river. There were some 14 or 15 of them to be seen, and, from the comfortable way in

which most of them were fitted up, there was evidently no expense spared by the proprietors to render living on board quite as desirable as the extraordinary nature of the place permits.

The River Bonny or Boni was one of the first rivers the Dutch, English, and Portuguese were acquainted with in this portion of Africa. From the sixteenth to the present century it was the favourite mart of the slave-ships, when the exportation of human beings was a legalised traffic, and the amount of slaves transhipped seldom came to less than 16,000 per annum. Most of these slaves were natives of the Eboe country; the remaining part were of the Allakoo country. Fairs for the purpose were held every five or six weeks at several villages on the banks of rivers and creeks in the interior, and large canoes, carrying 120 men, were employed in the navigation.

The entrance to the Bonny presents a broad expanse of water, consisting of the mouth of the Bonny to the eastward, and the New Calabar to the westward. The entrance to the River Bonny is very intricate, but our ship carried 24 feet of water over the bar. On entering the river, low, marshy banks, covered with mangrove bushes, were seen on either side, and on the starboard side the town of Bonny, ruled over by King George Pepple and Oko Jumbo, with other chiefs, &c. The country surrounding this town is low and marshy, consequently it is always unhealthy to Europeans. After seeing several of the hulks, I went on shore to view the town.

There is, of course, no proper landing-place; but, as the water is very shallow and the beach muddy, our boat's crew had to carry us some distance before we reached *terra firma*. The huts of the natives are built in the usual style of wicker-work covered with mud, and roofed in with palm-leaves and rushes. There is no furniture inside, with the exception of a few wooden stools, some mats, and raised seats made of mud. Crockery-ware and cooking utensils are placed in prominent places, to beautify and ornament the general appearance of the hovel.

Passing from the beach towards the town I went to the Jew-Jew-house (spelt also Dju-Dju, and Ju-Ju), the temple of the religion of these poor heathen, and it proved a sight I shall never forget. It is fact admitting no denial, that at the present moment cannibalism is practised amongst the natives of the Bonny, and is not by any means confined to the interior of the country. Certainly, from time to time, various treaties for the abolition of this fearful custom have been made with the natives, more especially of late years; but there exists no doubt that now and then the horrible practice is

resorted to by the conquerors, who satisfy their hunger by eating the bodies of their enemies.

The Jew-Jew house was a building not very large in extent, built of bamboo wicker-work, roofed and covered with mud, in the same way as the other houses. The door was fastened; but from a sort of window I could look inside, and see the horrible contents of this house of religion.

On ledges, completely round the interior, and in numbers sufficient to cover the walls completely, were ranged hundreds of human skulls; and in the centre of the room was an altar, built of the same horrible materials, to form a sort of table, at the foot of which were placed the offerings to the unknown deity or Jew-Jew. It is almost impossible adequately to describe the creeping sensation of horror on first gazing on such an extraordinary scene. From every nook and corner of the building, the hollow grinning aspect of a human skull met the eye, and the different lines of light and shade pervading the place, converted it at once into a scene ghostly sepulchral. The skulls also, to add to the horror of the display, showed unmistakeable traces of fire.

They were the remains of hundreds of poor creatures, whose flesh, to judge from the marks on the skulls, had been either boiled or roasted, to gratify the ogre-like appetite of the natives.

The gifts at the foot of the altar were valuable. I saw a magnificent tusk, beautifully carved, and there were many other native treasures. Many descriptions of crockery-ware appeared as offerings, and I am given to understand that plates, &c., with intricate patterns on both sides, are bound to be devoted as offerings to the Jew-Jew.

From the Jew-Jew house I walked through the filthy town, to what is termed the Palace of the Head Chief, "Oko Jumbo."

I was received by that worthy in the native costume, which may be at once described by stating that the only thing presented in the way of dress is a cloth round the loins. He spoke English very well, and is a most powerful and muscular man. He entertained me with some excellent Madeira, and, surrounded by his slaves and workmen, who were building him another palace, he was most affable and humorous. The palace he is now building promises to be a very good stone house, but the place inhabited at present is nothing more than an ordinary negro hovel, although answering to the name of palace.

I may here remark that the actual King of the Bonny is George Pepple, a negro educated in England, but eschewing all interest in native affairs; he lives chiefly in retirement, so that most of

the wealth and power of the Bonny country is vested in Oko Jumbo.

Returning from that chief's house, I may narrate, as a curious circumstance for Africa, I met a young negro lad nearly naked, reading a well-known work on mathematics, and I asked him why he read it, and how he came to be possessed of such a work. I learnt that he was a son of Oko Jumbo, and had recently arrived from England, where he had received a superior education.

That evening I slept on board one of the merchants' hulks in the river. During the night there was a fearful tornado,—the wind blowing with great force, accompanied by vivid lightning and an enormous quantity of rain. The wind blew so fiercely that at one time the river was converted into one broad sheet of foam.

It continued to rain all night, but early on the morning of the 5th of March I steamed away for the River New Calabar, and at 9 A.M. passed a small outlying reef, called Breaker Island, which, with the reefs surrounding, must, no doubt, be rapidly increasing in dimensions, owing to the amount of deposit from the Rivers Bonny and New Calabar.

I consider it very desirable that the whole of this portion of the coast should be re-surveyed, as it has not been surveyed for very many years. The latest corrections received are by Navigating-Lieutenant Langdon for the year 1867.

On entering the New Calabar River, the shore on each side presented a very picturesque appearance. There is a small bar at the entrance, easily passed by the mail-steamers. The surrounding country is extremely flat and marshy, but large trees and high shrubs extend right down to the water's edge, making penetration into the interior a work of some difficulty.

There are about ten or twelve hulks of the merchants, moored at the mouth of the river, which, from time to time, has borne the most deadly character, and carried off numbers of Europeans, whose bodies, attacked with the fell fever of Africa, have succumbed to its debilitating effects, and are now lying buried in the sand on the banks of the river.

The Rio Real is another name for the River New Calabar. The river is broad, and presents banks clearly defined on each side. The native town of New Calabar is about 8 miles further up than the merchants' hulks, and I anchored off there at 2 P.M. Tuesday is the Sunday of the natives here, and I embraced a favourable opportunity to proceed on shore, and endeavour to gain some information in reference to their religious ceremonies.

Captain Hopkins, H.B.M.'s Acting Consul, accompanied me, and

we paid a visit to King Amochree II., at his tumble-down mud-hut or palace. It was with some difficulty that we effected a landing at the town, owing to the immense amount of mud in which it is built.

It forms, with stakes driven in the mud all around it, a description of stockade, thus preventing enemies from landing without raising an alarm. To attempt to describe the filth and dirt, mixed with the mud in the streets of this town, would be impossible. You might almost see the poisonous malaria arising as you walked along, and feel it as you drew each breath.

By the banks of the river I saw a number of war-canoes, capable of having thirty men paddling on each side. In the centre sits the king or chief personage, and a rusty old gun is secured with matting, rope, &c., at the bows of the canoes; more dangerous, I should think to those who have the courage to fire it than to the enemy.

Some of the guns were of American make, others of very obsolete English patterns. The canoes, worked by sixty men, proceed with considerable speed, and present (with the chief on a daïs in the centre) rather an interesting sight.

On landing, I walked through the muddy paths, on each side of which were the mud-huts of the staring natives. On arriving at the house of King Amochree, he received us very cordially, and we sat some time with him. He is a fine, well-built man. He was well dressed, and had enormous bracelets of solid ivory on each wrist, very heavy and unpleasant to wear, I should think. Round his neck he had a very handsome necklet of large coral beads, intermixed with gold. He produced brandy-and-water, and the palm-wine or tombo, the latter only to be liked when a sufficiently acquired taste for soap and water is obtained.

Hearing the sound of gongs, I asked if there were any Jew-Jew ceremonies going on, and learnt that Tuesday being their Sunday, it was a great occasion for the furtherance of religion with them. Having obtained permission, we repaired to the Jew-Jew house, which was almost of the same dimensions I have mentioned in regard to the house at Bonny Town. On entering we were received by the high priest, or head Jew-Jew man, who presented an extraordinary appearance. He was a tall, muscular man, with handsome features and enormous breast; his colour was completely of a yellowish tinge, and he was quite naked, with the exception of a waistband. His head was shaved completely on the right side, and on that side, all down his body to the centre, he was covered with chalk or some white substance. An assistant was with him, and

they took a goat offered by one of the congregation, and, having cut its throat, permitted the blood to flow into a small hole dug in the mud of the floor, preparatory to fire being used to burn the sacrifice.

Ever and anon various gongs and bells were beaten in the hut by some natives; but we particularly noticed that there existed a restraint in practising their religion before us, and that when we entered they appeared to cease all demonstration until we were gone. The congregation consisted of the principal chiefs of the tribe, and there were no women present.

These men above referred to were worshipping with their tumblers by their side, and as their religious ardour overpowered them they imbibed various potations of their much-loved palm-wine, or the never-failing rum. As we entered they all rose to receive us, and placing chairs for us, offered us a similar refreshment, which we sipped only. I sat down by the side of a modern Hercules, who could speak a little English. This worthy was decorated with a wig of red hair, which he wore over his own wool, and I need only say that nothing more studied could have the more added to his natural ugliness. Some of the chiefs had on black wigs over their wool, and this gave them a sort of Indian look. I learnt afterwards that to possess a wig, and to wear it well, was considered by these chiefs as quite a Piccadilly or Rotten Row adornment, because they had observed, "white man he do the same." The portion of the Jew-Jew house above the head Jew-Jew man, and near the portion which I suppose ought to be described as the altar, was covered with an enormous number of wooden dolls for children, suspended to the wall, intermingled with penny looking-glasses and enormous wooden idols, very ugly and very badly painted.

On my asking my native friend the reason of this gorgeous display, with which I appeared much gratified, he replied with infinite gusto that "it was to make pretty for Jew-Jew;" and when I asked him whether "they were praying for peace or for war," he at once replied "peace"—a matter very desirable for them, with a number of British men-of war at hand, I should consider. There were numerous offerings of ivory (very valuable tusks), rum, palm-wine, and the never-failing plates and crockery, &c., to propitiate their deity. All the time we were inside the Jew-Jew house a number of horrible and very ancient native women, nearly naked, were outside yelling one of their Hymns (Ancient and Modern, I suppose—with a good deal of the former), and from time to time clapping their hands and uttering the wildest cries. Now and then one old hag, more hideous and toothless than the rest, advanced to me and performed various extra-

ordinary and by no means graceful dances for my edification, or else that I might give her something by way of a "dash." This attention on the part of this interesting female I acknowledged by bowing, at what appeared to me appropriate intervals, as, not understanding a word she said, I was not calculated to be capable of expressing much sympathy with her in her song.

Having seen all it was possible to see in the New Calabar River, we took boats and embarked on board our steamer. As we passed the stockades or walls of the town in our boats, we perceived numerous sacrifices to Jew-Jew. On the fishing-stakes many live fowls were attached as sacrifices, and left to die there, as some propitiation to the native deities.

From New Calabar River I proceeded to Fernando Po, an island so well known as to need no description from me. I have been particular, however, to minutely describe all I saw in the Jew-Jew houses of the natives, for I am given to understand that it is only on very rare occasions that Europeans have had opportunities of viewing the celebration of the extraordinary rites.

On the 7th March I left Fernando Po and went to Ambas Bay, on the mainland, situated at the southern base of the Cameroons Mountains, which tower up to the enormous height of 13,760 feet (the highest peak). The peak, however, that is closest to Ambas Bay is called Mongo M'Etindeh, and is only about 5000 feet high. The Cameroons Mountains have been well explored, and are reported to be covered with the most luxuriant verdure, and that there exists magnificent soil in the valleys amongst the range.

There are three islands in Ambas Bay, which add much to the picturesque nature of the scenery. I think, however, that the sea must be washing away some portion of the islands, which are very small, although inhabited by fishermen.

I landed at Ambas Bay, where fresh provisions are to be procured after a little difficulty.

There are some Sierra Leone men who are colonists here, but they do not appear to make the place thrive very well. The natives from the surrounding country visit them at times from the never-ending bush. I saw a few of them: they are short, insignificant-looking negroes, with their heads completely shaven.

From Ambas Bay I went up the River Bembia towards the River Cameroons, anchoring off King William's Town, Bembia. I landed in the cool of the evening; but found it impossible to take a walk, as there was no penetrating the interminable forest. The heat also was very oppressive, and the wind, coming over the low and marshy banks of the river, anything but healthy. During the

night we were pestered with myriads of flies and winged ants which repaired on board, attracted by the light. The day after, we returned to Fernando Po.

In conclusion, I may remark that, in my experience of travel (in North America, Central America, the West Indies, &c.), I have never been so thoroughly impressed with the fatal nature of climate to Europeans as during this recent cruise in the west African rivers. Sooner or later the seeds sown during exposure must reap a harvest on the frame of the white man, too often resulting in death, and in verifying the oft-quoted passage:—

> "Where the fever hot and damp,
> Shed by day's expiring lamp,
> Through the misty ether spreads
> Every ill the white man dreads,—
> Fiery fever's thirsty thrill,
> Fitful ague's shivering chill."

The following discussion took place on the Formosa Paper:—

Admiral COLLINSON said, although the island of Formosa was in sight from the mainland of China, there was no record of its having been visited by the Chinese before 1430, when a settlement was made there, and a Malayan race was found to be inhabiting the island. After a short time had elapsed the Japanese took possession, and subsequently, in 1620, the Dutch, who first settled in the Pescadores Islands, they next built a fort at Zelandia, opposite Tai-wan-fu, and remained there for 40 years; but in 1660 they capitulated to Koxinga, who is sometimes called a pirate, but who was really a Chinese who objected to the Tartar dynasty. By his nautical exploits he prevented the Tartars from obtaining possession of the province of Fu-kiang; but, unfortunately, he was wiled into going to Pekin where he lost his life. His son, however, continued to resist the Tartars and retained possession of the maritime ports. He also assisted a great many Chinese to migrate from the province of Fu Kiang. Ultimately, finding that the Tartar dynasty was becoming too powerful, the Chinese in Formosa submitted, an amnesty having been proclaimed for all offenders. The island was of great value to the adjoining coast, where there were few alluvial plains. It supplied rice, ground-nuts, and camphor wood to the province of Fu Kiang. He had visited Tai-wan-fu with Sir Thomas Cochrane, but the surf was too heavy to permit of their landing. He afterwards sailed up the east coast, keeping as close as possible to the shore. To the south-east there were several populous villages and signs of cultivation, but he only found one place convenient for anchorage. He had an interview with three of the natives, but as he was in hopes of finding harbours further to the north he did not spend much time with them. From his short interview with them he formed the impression that they were of the Malayan race. They had no hesitation or fear in communicating with Europeans; but he had previously heard from the Chinese that they were cannibals, who lived in trees, and used poisoned arrows. Further north he passed two large rivers, but descried no other harbour on the east coast. In the harbour of Kelung, at the north end of the island, he saw a junk taking in coal. He also visited the coal-mines, and brought away a considerable quantity, which had since been examined and reported as very

good. There was no lack of labour at Kelung, and the harbour was accessible at all times.

Mr. WINCHESTER said he had spent a considerable portion of his life within sight of Formosa, though he had never actually visited the island. Although Amoy was in nearly the same latitude as Tai-wan-fu, all the productions received at Amoy from Formosa were of a much more tropical character than those that grew on the mainland. There could be little doubt that the climate of the island was nearly 15° warmer than that of the opposite shores of China; for pine apples, the finer kinds of custard-apples, shaddocks, and other fruits were grown, which required great care in cultivation on the mainland. Formosa was one of a chain of islands bordering the north-eastern continent of Asia. The chain might be said to commence in the Malay seas, and thence to continue along the Philippines, to Formosa, Japan, the Kurile Islands, and the north-west of America. This chain of islands was remarkable for its volcanic features, and earthquakes of great severity were experienced. In many of the islands the existence of coal in workable quantities had been demonstrated. With all its natural wealth and favourable climate, Formosa must always, to a great extent, be shut out from commerce in consequence of its want of harbours. During the north-east monsoon a strong current set in along the narrow channel between Formosa and the mainland, making it very difficult for vessels to approach. On the eastern side the current was more favourable, and before steamers were employed in commerce the opium clippers, and other vessels going to Shanghai from Hong Kong, generally worked up that coast.

Mr. MARGARY said he had lived for a year at the northern end of Formosa, having been sent to Tamsui on duty in connection with the consulate service. He had passed some time in Kelung, and in travelling between the two places, a distance of about 40 miles, had to go up and down a branch of the river which was full of rapids, there being about twenty. He travelled in a native flat-bottomed boat covered with a kind of matting. The hills about Kelung were full of coal, which was so conveniently placed close to the harbour, that the expense of carrying it away would be inconsiderable. It was very good coal, the only objection raised to it by shipmasters being that it made the funnels and other parts of the machinery intensely hot. At Tam-suy there was the remains of an old Dutch fort,—an immense square building with walls 10 feet thick. It was now used as a sort of consulate by the English vice-consul there. By our treaties with China, Tamsuy and Tai-wan-fu were both open to commerce. While he was at Tamsuy there was a shock of an earthquake so violent, that, notwithstanding the thickness of its walls, the old fort shook like a rickety table. The merchants who lived there occasionally travelled a considerable distance into the interior. One of them, Mr. John Dodd, who had for several years been endeavouring to establish a tea trade there, and had succeeded in doing so, had been amongst the savages, and, although they were reputed to be cannibals, he had stayed amongst them some months. As to their being uncivilised, they had tried to induce Mr. Dodd to marry the daughter of the chieftain, which resulted in his beating a hasty retreat.

The PRESIDENT said the discussion which had taken place showed that it would be absolutely impossible in the present day to practise such a forgery as that which had taken place in the last century with regard to Formosa, when the scholar who wrote under the assumed name of "George Salmanezar" palmed off upon the *savans* of Europe his history and language of Formosa. He not only invented a history, but in order to authenticate the history he invented a language and a grammar, and gave the original of his history in an entirely fictitious language. It was so very skilfully and elaborately accomplished that it deceived the *savans* of France and England for

many years, and thirty or forty years afterwards there was still a doubt as to whether it was spurious or genuine. The island was curious in an ethnological point of view, from the fact of a Malay race being found in such a high northern latitude. This subject was well worthy of accurate investigation, and as we became better acquainted with the island many curious discoveries might be made.

LIVINGSTONE AID EXPEDITIONS.

After alluding to the excellent series of photographs exhibited by Mr. Thomson, and proposing a vote of thanks to him, the President reverted to the subject of African exploration. He said a letter had that day been received from Lieutenant Grandy to the following effect:—

"St. Paulo de Loanda,
"Wednesday, January, 22, 1873.

"SIR,

"I have the honour to report that we arrived at this place, all well, on the evening of the 20th inst., and disembarked the following evening at 10. The Governor has signified his intention to free our baggage from the usual Custom's charges, and we hope to get the order to-day. The Acting British Vice-Consul will introduce us to his Excellency and other officials this afternoon, so that, in all probability, we shall be able to commence work to-morrow, and hope to complete everything in 14 days from this. We have not had an opportunity yet of making inquiries about the best route, carriers, &c., but I trust to be able to give all particulars by the next steamer. This mail closes in a few hours.

"I have the honour to be, Sir,
"Your most obedient Servant,
"W. J. GRANDY.

"*Sir Henry Rawlinson, K.C.B., &c.,*
"*President of the Royal Geographical Society.*"

Despatches had also been that day received from Sir Bartle Frere at Zanzibar. In a letter to the Society, Sir Bartle said,—

"H.M.S.Y. *Enchantress*,
"Zanzibar, 12th February, 1873.

"SIR,

"I have the honour to request that you will be good enough to inform the President and Council of the Royal Geographical Society that I have permitted Lieutenant Cecil Murphy of the Royal Artillery to join the East Coast Livingstone Relief Expedition under Lieutenant Cameron, R.N. Lieutenant Murphy arrived at Zanzibar in the mail steamer *Panjab* on the 9th inst.

"The circumstances under which I deemed it advisable to support Mr. Murphy's application to be thus employed are explained in the enclosed copies of original correspondence on this head.

"Before taking any steps in this matter, however, I ascertained clearly that Mr. Murphy's companionship was strongly wished for, both by Lieutenant Cameron and Dr. Dillon; and Lieutenant Cameron also reported that, after a careful estimate, he considered that Mr. Murphy's Indian pay, which that officer declared himself willing to devote to the payment of his expenses, would fully cover any extra expenditure his presence might entail on the Expedition. The only cost, therefore, to which the Royal Geographical Society will be put is that of a passage for Mr. Murphy and servant from Aden to Zanzibar.

"I consider the acquisition of Mr. Murphy's services to be of the greatest possible advantage to Lieutenant Cameron's Expedition. Mr. Murphy is strong and active, and having been formerly in the Royal Engineers is well

acquainted with the use of scientific instruments. He served with credit through the whole of the Abyssinian campaign, and is well spoken of by all with whom he has served; and he has, moreover, the greatest interest in the work on which he will be employed.

"H. B. FRERE,
"Special Envoy to Zanzibar and Muscat.

"*To the Secretary,*
"*Royal Geographical Society, London.*"

The instructions given to Lieutenant Cameron and party were as follows:—

Memorandum of Instructions for the Livingstone East Coast Expedition; given at Zanzibar by Sir BARTLE FRERE, K.C.B., &c.

"The command of the Expedition is entrusted to Lieutenant Lovett Cameron, R.N. In the event of his being incapacitated for exercising the command it will devolve on Dr. Dillon, and after him on any European officer who may be ordered to join them. [Lieutenant Murphy, Royal Artillery, has since joined.]

"The following are the instructions addressed to the officer commanding the Expedition:—

"1. The first and principal object of the Expedition under your command is to effect a junction with Dr. Livingstone, and to deliver into his hands the various letters, stores, packages, &c., &c., of which the Expedition has charge; and to assure him of the unabated admiration and interest with which his proceedings are watched by his countrymen and by the whole civilized world.

"This done, you are to assist him in every way and inform him that it is the desire of the Royal Geographical Society that you should place yourself, with the whole of the members and resources of your Expedition, absolutely and entirely at his disposal, to carry out any such work as he may direct and advise.

"2. On arrival at Lake Tanganyika you will endeavour to ascertain the probable direction in which Dr. Livingstone may be found, and to follow him or cut across the route which he has indicated, or which you may ascertain by local enquiry as that which he is likely to adopt. Should you find it very doubtful whether by this means you can effect a junction with him, it will probably then be advisable that you should place in safety the greater part of the stores and letters, &c., in your charge, either at Ujiji or at some other point where they could be most easily reached by Dr. Livingstone, in the event of his returning towards the East Coast, as he informed Mr. Stanley he intended to do; and you should then take all practicable steps to give information to the Doctor of your having done so, as also of your intended subsequent movements.

"These movements should be guided mainly with a view to effecting a junction with Dr. Livingstone, or to the completion, amplification, and verification of any of the Doctor's work, in the country in which you may find it practicable to penetrate, while you are awaiting further intelligence of him.

"3. The completion of the examination of the Tanganyika Lake and the exploration of Lake Victoria Nyanza have been indicated, the latter by Livingstone himself, as works of the greatest importance: and I would especially impress upon you the necessity of testing and verifying in every possible way the altitude of the Tanganyika Lake.

"4. The latest information as to Livingstone's proposed movements is to be found in Stanley's book, page 626, of which you have a copy, in the September

number of 'Ocean Highways,' and in Keith Johnston's map of 1872. These will aid you in deciding as to the most likely points at which you might be able to cut across the Doctor's line of march.

"5. As to the route to be taken by you to Lake Tanganyika, it is necessarily, in the present unsettled state of the country, left entirely to your decision. Your main object in deciding between diverse routes (where other conditions are equal) should be the means of effecting the quickest possible junction with Livingstone and the extension of geographical knowledge.

"The same discretion is afforded as to your return route, should you not be successful in meeting with Livingstone. Otherwise you will, of course, follow his directions.

"6. You will not fail to communicate with the Royal Geographical Society as often as possible through H. B. M.'s Consul at Zanzibar, who will afford you every assistance; and you will consider it your first duty to send the fullest reports and acquisitions of scientific knowledge to that Society. These reports and observations should be made as complete as the means and instruments at your command will allow of. Careful and repeated observations for altitudes are specially desirable, as well as the accurately determining the position of all places you may visit; the preparation of a continuous map; and the systematic keeping of a daily journal. It is not requisite, however, to enlarge upon these details, as they must necessarily be familiar to an officer of your acquirements and experience.

"7. You will endeavour in every way to gain intelligence of Sir Samuel Baker; and, although there may appear to be little chance of your meeting with any trustworthy intelligence concerning the fate of survivors of the *St. Abbs* or other ships wrecked on this coast, it will be well constantly to keep before you the possibility of acquiring some intelligence through caravans, traders, &c., &c., of Europeans, whether captive or free, living among native tribes; and it is not necessary to remind you that the verification of such intelligence, and still more, communication with the persons to whom it relates, will be of the utmost interest and importance.

"8. Enclosed is a list of the letters, papers, and packages which, with a small supply of English stores, have been handed over to you for Doctor Livingstone. These may be divided and deposited in separate places, should it be found advisable to leave them at spots likely to be visited by the Doctor on his line of march.

"Enclosed, also, are letters of safe conduct and recommendation provided by the Sultan of Zanzibar, and H. B. M.'s Consul, &c., &c., for the Expedition under your command.

"9. The arrangements for supplying you with funds are discussed in another communication to your address.

"10. Should you be met by rumours, such as have been so often falsely circulated, of Dr. Livingstone's death, you will spare no pains to ascertain the facts relating to him which may have given rise to such reports.

"11. In conclusion, it is hardly necessary to express to you the confidence felt by the Royal Geographical Society that your proceedings towards the natives will be characterized by the exercise of that tact and temper which are so essentially necessary to enable you to conduct the important mission with which you are charged to a successful termination: as well as to ensure your prosperous return to your native country, for which you have the best wishes of all your friends here and in England."

The PRESIDENT remarked that these instructions appeared to anticipate every possible contingency. In the last number of the 'Proceedings' of the Society there were two letters from Dr. Livingstone which had not previously been circulated in England. They were addressed to Sir Thomas Maclear, the

Astronomer Royal at the Cape, and contained some important and interesting information, especially as regarded Livingstone's astronomical observations. They explained the means by which he had endeavoured, with what he called "dead chronometers," still to obtain a longitude, by setting the watch to go for a limited period and taking a series of lunar distances and altitudes over that period, from which he hoped to obtain a rating for the few minutes during which the observations were made. Another interesting matter discussed in those letters was with regard to Lake Tanganyika, showing that up to the time of Stanley's arrival at Ujiji, and his journey to the north of the lake, Livingstone was fully impressed with the conviction that Lake Tanganyika was nothing more than what he called a lacustrine river, flowing steadily to the north and forming a portion of the great Nile Basin. The letters contained his reasons for forming that opinion, stating that he had been for weeks and months on the shores of the lake watching the flow of the waters northward. It certainly was very curious that he should have devoted his attention to the subject, and apparently arrived at a wrong conclusion. This was at present the most interesting matter to be cleared up in African physical geography. No physical geographer believed that Tanganyika could be as fresh as it is if it had no outlet. All other freshwater lakes that were known—such as Lake Chad and the Lake of Seistan—could be explained, but in a lake like Tanganyika, with precipitous rocks around the sides, the usual explanation was impossible. If there was no exit every physical geographer must acknowledge that, in process of years, the water must become salt. With reference to the coal question that had been remarked on in connection with Formosa, he wished to remind the meeting that in Baron Richthofen's report of his survey of the great coal-fields of China, he had found that there was there a continuous and excellent coal-field of 400,000 square miles.

Colonel GRANT, referring to Livingstone's statements with regard to Lake Tanganyika, said there could be no doubt whatever about the water there being fresh, for Speke and Burton, as well as Stanley, had reported so. He could not understand how Dr. Livingstone could have seen the waters flowing northward, and thought he must have been mistaken about it. It was very probable that the waters of the lake did not percolate through the soil, but escaped towards the east coast from the south-east corner of the lake. Lieutenant Cameron would probably have no difficulty in finding Livingstone when once the expedition reached the interior, because it would be the season when all the caravans were proceeding backwards and forwards, and the intelligence to be obtained from the merchants was always pretty correct. He himself had received a letter from Dr. Kirk, who placed the greatest confidence in all three gentlemen of the expedition. He was glad to hear that Bombay, Speke's old servant, was organising Lieutenant Cameron's porters. Bombay was a most valuable man, and if he could be persuaded to accompany the expedition he would greatly aid in bringing it to a successful termination.

The Reverend H. WALLER said he had not the slightest doubt, from his knowledge of Livingstone's accuracy of observation, that he did see the water of Tanganyika flowing northward. There must be an outlet somewhere. If it was some distance from the north end, the flow opposite Ujiji would, of course, be to the north, while, at the extreme north, the flow would be to the south. He himself, however, had a sort of belief that there was an outlet from the south-east of the lake. Whilst on this subject, it should be remembered that Livingstone had fixed the 1st of March in the present year, as the probable date of his return to Ujiji, and it might be, that knowing the intense interest taken in his journeys, and expecting that some effort would be made to meet him there, he would strive to be back by that date, and so meet the expedition on their journey inland.

Mr. A. G. FINDLAY thought there could be no doubt, after what Livingstone had said, that he had really seen the waters of the lake flowing to the north. Stanley's suggestion that he heard the water flowing out on the west side was utterly impossible, and at present no explanation could be given of the mystery.

The PRESIDENT said the Fellows of the Society had, no doubt, felt greatly distressed at the intelligence which had appeared in the 'Times' of the danger in which Sir Samuel Baker was placed. No official telegram had, however, been received from Colonel Staunton, our Consul-General in Egypt, although he was in the habit of telegraphing all important information. It was, therefore, fair to conclude that no official intelligence of such a calamity overtaking Sir Samuel Baker had been received at Cairo or Alexandria. The relief expedition organised by the Khedive had left Suez for the east coast of Africa; and they would proceed into the interior from Mombas or some point in the vicinity, from whence they would pass along the base of Kilima Njaro and the shores of the Barengo Lake, so as to endeavour to relieve Baker from the south. The expedition, however, only consisted of 80 or 90 men, and, if the news about Baker were true, it was doubtful whether he would be able to hold out till their arrival. If, however, any information of such a disaster to Baker's party had reached the Egyptian Government, there could be no doubt that it would have been at once communicated to the British Government.

Ninth Meeting, March 24th, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Hans Busk, Esq.; Major Andrew Cathcart; Robert Galsworthy, Esq.; Henry Hill, Esq.; A. B. Mitford, Esq.; George B. Tipping, Esq.; Henry Wagner, Esq.; John Wonnacott, Esq.*

PRESENTATIONS.—*A. R. Margary, Esq.; Macrae Moir, Esq.*

ACCESSIONS TO THE LIBRARY FROM MARCH 10TH, TO MARCH 24TH, 1873.—'The Kaieteur Falls,' British Guiana.' By Lieut.-Colonel Webber. 1873. Donor the author. 'Zur Topographie von Athen.' Von P. W. Forchammer. 1873. Donor the author. 'The English Factory Legislation. By E. E. von Plender. Translated from the German by Dr. F. L. Weinmann. 1873. Donor the translator.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MARCH 10TH, 1873.—Map of the Country of the Upper Oxus. 6 copies. Presented by E. Weller, Esq. 4 Sheets of Admiralty Charts. Presented by Admiral G. H. Richards, C.B., Hydrographer to the Admiralty. 64 Sheets of French Charts. Presented by the Depôt de la Marine, Paris.

After a few introductory remarks, the PRESIDENT communicated to the Meeting the following Paper:—

Notes on Khiva. By Major-General Sir H. C. RAWLINSON, K.C.B., President.

[ABSTRACT.*]

KHIVA, the tract of country south of Lake Aral, fertilized by the Delta channels of the Oxus, was probably one of the earliest settlements of the Aryan race. It seems also to have been the true cradle of Eastern Asiatic science, the date, 1304 B.C., claimed by a native scholar for the people of Kharism, according with the date of invention of the Median calendar. It is probable that the invention of a lunar as well as a solar zodiac arose in the same ancient country and passed thence to China and India. A curious feature in the physical geography of the region is the fluctuation which has taken place in the lower course of the Oxus, the river at one epoch flowing to the Caspian, and at another to the Aral. The stream was gradually deflected from the Caspian to the Aral during the fifth and sixth centuries of our era; and there exists an historical notice of the sea of Kardar, above Urganj, which was fed by the Caspian branch of the Oxus, drying up in the sixth century. From 500 to 1220 A.D., during which the river flowed, as now, into the Aral, the Caspian became, to some extent, desiccated, its waters retiring for a long distance on its eastern shore. After the latter date the river again changed its course into the Caspian, and several fertile districts on the eastern shore of the sea became thereupon submerged. This lasted for 350 years. Between 1575 and 1675 the river again reverted to the Aral, since which no similar alteration has occurred. Regarding the Russian project of again diverting the Oxus waters to the Caspian, and thus creating an uninterrupted water-navigation, *viâ* the Volga and its canals, the Caspian, and the Oxus, from St. Petersburg to Afghanistan, the author quoted passages from the work of a recent Russian engineer, showing that, though the diversion was practicable, it was impossible that the stream could be a navigable one. The Oxus is a rapidly-flowing stream (5 to 6 miles an hour), and silt rapidly accumulates in its canals and side-channels, needing an immense number of labourers to clear them annually. The present population is insufficient for these requirements, notwithstanding that the labour of Persian slaves is employed. In the event of her taking possession of the country, one of Russia's greatest difficulties would be the want of labouring population. The principal roads leading across the vast deserts which surround Khiva were, first, along the western side of the

* Of the geographical portion only, the political part is not here reported.

Ural; second, along the eastern side, from Fort No. 1 on the Jaxartes; third, another road a little further east; fourth, from Samarcand and Bokhara; fifth, from Merv; sixth, from the mouth of the Attrek; and, seventh, from Krasnovodsk, on the eastern shore of the Caspian.

Mr. R. MICHELL said if the Caspian was receding from the south-east it must be encroaching on the Astrakhan steppes to the north. The Volga in ancient times was a highway of commerce, but now its mouths were silting up—there was a bar at the entrance, and the navigation of the river was but indirectly connected with that of the Caspian. If it was true that the Oxus formerly came down by the southern channel into the Caspian, it would seem to bear out the theory of old writers that there were three rivers running parallel to the west, viz., the Jaxartes, the Kizil-Su, and the Oxus. If the central river was called Kizil-Su, or Red River, it would naturally fall into Red Water Bay. The only proof, however, of that was the bay itself, for the river had disappeared. The geography of the north of Khorassan and of the Turcoman country was tolerably well known, and maps such as those recently produced by the Topographical Department might have been constructed long ago, if the works of English and other travellers had been more thoroughly digested. Very little information concerning this region had been acquired since the days of Fraser, Conolly, Burns, Ferrier, and others, but the works of these supply a great deal. Now, however, that public interest had been aroused, maps were forthcoming. A good frontier for the Russians would be along the Chink. There were only one or two passes from the higher level into the deserts 600 or 700 feet below; it would form a capital "natural boundary," which was what the Russians had been seeking ever since they had been in Asia. Mr. Michell then announced that a plan of Khiva had been found, and read a description of that Khanate drawn up by a Russian topographer in 1858. The town is situated between two canals, and is surrounded by two walls. The inner one is about 1040 fathoms in length, the outer one 3100 fathoms. The configuration of the outer defences is pear-shaped, the inner town forming a parallelogram, of which the eastern and western fronts are 300 fathoms in length, and the northern and southern sides 230 fathoms. The Khan resides in the inner town, his palace being near the western gate: the suburbs of the outer town contain many residences and beautiful spots.

Mr. EASTWICK said he had travelled along the southern coast of the Caspian to Astrabad, and there was certainly no appearance of the sea receding there, for the line of sand between the high jungle and the sea itself was extremely narrow. He had, however, a rather disagreeable proof that it was receding on the eastern side, for the vessel on board of which he was ran ashore in rather too close proximity to the Turcoman tents. That recession might perhaps be owing to the diversion of the Oxus. Of course these inland seas, in a country where the heat during summer was so intense, were liable to be dried up, and no doubt the Caspian would dry up at a very rapid rate if it were not for the great rivers which ran into it. The territory immediately around Khiva was extremely rich, and produced some of the finest fruits in the world, the melons especially being superior even to those of Persia. The richness of the soil might therefore be some inducement to Russia to remain there, if she once occupied the country. During certain months of the year there was no climate in the world equal to that of Khiva. We must not, therefore, be too confident that Russia would easily relinquish what she might obtain.

Mr. R. B. SHAW said the loss of the Oxus in the Aral Sea was paralleled on the other side of the Pamir by the loss of the great rivers of Eastern Turkistan.

It was a very strange fact that the rivers which took their rise in and flowed eastward and westward from the great "Roof of the World" failed to reach the ocean in either direction. On the western side the Oxus and the Jaxartes died away in the Aral Sea (the Zarafshân being absorbed in the irrigation of Bokhara), whilst the rivers on the eastern side died away before reaching China, a fresh set of rivers starting up there and flowing into the ocean. The increase of cultivation, if such a thing were historically possible, might account for the termination of the Oxus in the Aral Sea. Cultivation would naturally drain the rivers to a great extent, and thus prevent their penetrating so far from their sources as they otherwise would. That irrigation was capable of draining a river dry in these regions was evidenced by the case of the Zarafshân and others. The inverse of this process, too, might account for the old tales of moving deserts, which were said to have invaded vast provinces and covered rich cities and fields. The stoppage of irrigation proceedings on the part of the cultivators, who were prevented by war or other circumstances from keeping the canals open, would of course leave land uncultivated which had formerly been cultivated; the soil would become (as it always does there when not irrigated) dry and friable like sand, and this, in the traditional language of the country would be spoken of as the desert encroaching on the cultivated land. The more he heard of the regions just described by Sir H. Rawlinson, of the wild state in which they were, and of the insecurity of life and property, the more he was struck with the contrast offered in Eastern Turkistan. In the country of the Atalik Ghazee there was the most perfect security; the richest caravans passed along the roads without any escort, and an armed man was never seen, unless he was a soldier on duty. This showed a degree of natural civilization in no way inferior to that which Russia seemed to introduce into the countries she had conquered at much cost to both parties, and he therefore hoped, whatever might be the fate of Khiva and the Turkoman countries, that Eastern Turkistan might escape the civilizing influences of Russia.

General STRACHEY said the evidence which Sir Henry Rawlinson had brought forward afforded reasonable proof of the curious circumstance that the course of the Jaxartes and the Oxus had been changed within the historical period. What is known of the geological formation of the tract of country extending from the Caspian to India seems to supply sufficient indication that the present state of Central Asia was the result of a very great change that had taken place in the form of the earth's surface in that part of the globe in comparatively—geologically speaking—modern times. The elevated tract between the Caspian and the Aral Seas was geologically of very much the same character as the hills which skirted the Indus, and ran from the Indian Ocean to the Punjab. It was probable that the elevation of the earth's crust, which had thrown up the plains of Turkistan from the bed of the ocean, left those two isolated seas, the Caspian and the Aral, and that a simultaneous or nearly simultaneous upheaval had affected the tract through which the Indus now ran, and that those desert plains were the remains of the old sea bottom, very similar to those of Turkistan. The abandoned river-beds of the Oxus which Sir Henry had described were altogether similar to those which might still be seen in Sindh, through which, no doubt, in years long gone by, the waters of the Indus were conveyed from Upper India to the sea. There was nothing improbable in the supposition that considerable movements of the surface, capable of changing the directions of these rivers, had continued into the historical period, and there was indeed direct proof of such movements in Sindh.

Sir RUTHERFORD ALCOCK said the historical and geographical facts which Sir Henry had referred to showed the important part which geography played in the political drama that was going on in Central Asia. Nothing

had tended so much to prove the utility, as well as the political and national importance, of the pursuit of geography than the discussions that had taken place during the last few years with regard to the progress of arms and diplomacy in Central Asia. The late agreement concerning the boundary of Afghanistan showed how desirable it was to have precise information with regard to the geographical features of a country. It was not many years ago that the Oregon boundary was almost a question of peace or war between this country and America; and if the distribution of the waters around San Juan had been properly known, the Treaty of Washington would probably have taken some other form than that which it had finally assumed. The study of Geography, then, was not a mere idle or dilettante pursuit, but one that had a direct and important bearing upon national interests. With reference to what had been taking place in Central Asia, so far as the "inevitable tendency," as it was called, of Russia to press down to southern seas was concerned—he admitted the tendency, but he did not think it possible that she could ever press through Persia, Turkistan, Afghanistan, and Beloochistan. Such a task seemed far beyond the power of any human combination that could be imagined. He was inclined to agree with Sir Henry Rawlinson that Russia, in endeavouring to penetrate by force of arms, and so to press her caravans of commerce across the whole breadth of Turkistan into China, had undertaken a most "Herculean" task, and she would find that the only way to open a way to China must be by peaceable means, by diplomacy and commerce, and not by war. So far from England showing any jealousy, or a disposition to take up arms against Russia to dispute with her the possession of these most intractable and dangerous regions, overrun by tribes of the most warlike character, it should be our policy to exercise diplomatic influence at Teheran, with the Yakoob Beg at Yarkand, and with the Emperor of China at Peking, in order to open up routes through Nepaul and Sikim to the countries north of India, and then the merchants of Liverpool and Manchester would do the rest.

The PRESIDENT, in reply to a question from a member, said the best authority with regard to the fertility of Khiva was Arminius Vámbéry, who remained there for many months. He reported very highly of its productive powers. An abundance of cereal produce, however, or even melons, would not give political value to a country. Khiva might, no doubt, be made productive to any extent, if the population was large enough; but the evil was that there were no hands to carry on the cultivation. The original cultivators, the old Persians, had died out, and at present great part of the cultivation was carried on by means of Persian slaves; but that source of supply would also be cut off before long, and it was very unlikely that colonists from Germany or Russia, still less from England, would be induced to settle there. It was on those grounds that he foresaw much difficulty for Russia in making both ends meet if she occupied the country. This, however, was merely speculation. The object of the Society was to collect geographical data, and, if he had had more time, he should have been glad to have gone at much greater length into geographical details; for very extensive information was obtainable from Russian as well as British sources. He had, however, been obliged to pass over in a general way the great hydrographical features of the country. The Society might congratulate itself on the interest of the discussions which took place at its meetings—an interest so great that on the present occasion they were honoured with the presence of their Vice-Patron, His Royal Highness the Prince of Wales. He hoped that on future occasions subjects of equal interest might be discussed there, and that His Royal Highness might again favour them with his presence.

On the motion of Sir RUTHERFORD ALCOCK, seconded by His Royal Highness THE PRINCE OF WALES, a vote of thanks was accorded to Sir Henry Rawlinson.

Tenth Meeting, 28th April, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS. — *His Highness Prince Giustiniani Bandini; Henry Lovett Cameron, Esq.; General Sir William Codrington*, G.C.B.; *Robert Alfred Cottrill, Esq.; J. Irving Courtenay, Esq.*, Barrister-at-Law; *The Marquis Giacomo Doria; Frank Fitz-James, Esq.*, C.E.; *Colonel J. C. Gawler; George Hawker, Esq.; F. Jacomb Hood, Esq.; George Albert Hutchins, Esq.*, C.E.; *William Woods Johnstone, Esq.*, M.D.; *John Marshall, Esq.; William Augustus Holder, Esq.; Henry Thomas Pollard, Esq.; J. W. Price, Esq.*, C.E.; *Captain Wheatley Robertson*, Madras Staff Corps; *Lieutenant-General Charles Stuart; John Robert Williams, Esq.*

ACCESSIONS TO THE LIBRARY FROM MARCH 24TH TO APRIL 28TH, 1873.—'Quarterly Statements of the Palestine Exploration Fund.' From the Secretary. 'Rio Grande do Sul et le Paraguay.' By A. Baguet. Anvers, 1873. Donor the author. 'Amoy and the Surrounding Districts.' By George Hughes. Hong-Kong, 1872. Donor the author. 'General Rule for Filling-up all Magic Squares.' By S. M. Drach. 1873. Donor the author. 'Annali del Museo Çivico di Genova.' Genova, 1872. Donor the Marquis G. Doria. 'New Homes in Australia and New Zealand.' 1873. By G. S. Baden-Powell. Donor the author. 'Varietés Orientales.' Par Léon de Rosny. Paris, 1872. Donor the Duc de Rosny. 'A Voyage to Senegal.' By M. Adanson. 1759. Donor J. V. Irwin, Esq. 'Gerardi Mercatoris Atlas.' Amsterdam, 1632. 'Names of Parishes, &c., in England in 1668.' By Thomas Jenner. Donor S. M. Drach, Esq. 'Report on the Census of Bengal.' By H. Beverly. Calcutta, 1872. Donor the India Office. 'On the Right Ascensions of the Equatorial Fundamental Stars.' By S. Newcomb. Washington, 1872. Donor Comm. B. F. Sands. 'Science of Language.' By A. M. Cameron. Calcutta, 1871. Donors the Behala Society. 'Notice sur C. Babbage.' Par A. Quetelet Bruxelles, 1873. Donor the author. 'Observations des Phénomènes periodiques pendant 1870 en Bruxelles.' Par A. Quetelet. Donor the compiler. 'The Transit of Venus in 1874.' By J. H. C. Coffin. Washington, 1872. Donor Comm. B. F. Sands.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MARCH 24TH, 1873.—Part 3 of the Topographical Atlas of Switzerland on the

scale of the original survey, 12 sheets. Presented by the Federal Staff Bureau. A general Map of Turkey and the Kingdom of Greece, with a Plan of Constantinople, on 13 sheets. 1869. By purchase. A general Map of Servia and the Banat, on 4 sheets. By Emanuel von Friedberg. 1853. By purchase. Hypsometrical Map of Moravia and Austrian Silesia, on 1 sheet. Professor Carl Koristka. 1863. By purchase. 7 Maps of the Russian Empire, viz.:—Post Map of European Russia, on 12 sheets; Post Map of Asiatic Russia, on 2 sheets; Telegraph Map of the Russian Empire, on 4 sheets; Map of Turkistan, on 2 sheets; Plan of St. Petersburg, on 4 sheets; Railway Map of European Russia; Statistical Atlas of European Russia, Parts 1 and 2. By purchase. 8 Maps of Germany:—Geological Map of Germany, by Dr. von Dechen; Geological Map of Prussia and Thuringia; Map of Upper Silesian and Polish Mining Districts; Geological Map of the Province of Upper Silesia; Geological Map of the Province of Saxony; Geological Map of the Province of Prussia; Map of the Bosphorus; Plates for instruction in Plan and Hill Drawing. By purchase. Battle-fields of the Prusso-Austrian Campaign of 1866, Parts 1 and 2, on 11 sheets, with three route-maps. By purchase. Geological Map of the Coal-basins of the Saar-Rhine Country, by Drs. Weiss and Laspeyres. By purchase. Atlas of Ancient Greece and its Colonies, Parts 2 and 3, containing 10 sheets. By purchase. 10 sheets of a Geological Map of Switzerland, on 25 sheets. By purchase. Map of Switzerland, on 2 sheets. By R. Leuzinger. By purchase. Map of the Post-roads, Telegraphs, and Railways of Switzerland, on 4 sheets. By R. Leuzinger. 1871. By purchase. A Political, Historical, Geological, Hydrographic, and Industrial Atlas of Switzerland. By J. Gerster. By purchase. Map of the Canton of Neuchatel. By A. de Mandrot. 1870. Map of the Holy Land. 1872. By A. de Mandrot. Donor Jules Sandoz. A General Hypsometrical Map of Baden and Würtemberg. By W. Jordan. 1871. By purchase. A Geological Map of the Netherlands, on 28 sheets. By W. C. H. Staring. By purchase. A Post and Railway Map of Prussia, on 9 sheets. By the General Post Department. 1871. By purchase. A Plan of the Triangulation of Bombay Harbour. 1862-3. A Chart of Bombay Harbour, on 6 sheets. By Lieutenant R. W. Whish, I.N. Presented by the India Office. Map of Victoria, Australia, published by the Government. 1872. Presented by Captain R. Robertson, Bengal Staff Corps. Atlases in sheets and bound:—Bibel-Atlas von Th. Menke, on 8 sheets. Chart of the World, on 8 sheets. By H. Berghaus. 6th Edition. Spruner's Historical Map of Europe, Western Asia,

and North Africa, 15 sheets. Atlas illustrating Ancient History and Geography, 18 Maps. By T. Menke. Karte von Europe. Dr. A. Petermann. 1871. Map of Germany, to illustrate the Natural Relief of the Land. 1866. General Mission Atlas. Dr. R. Grundemann. Parts 4, 5, 6, 7, 8, 9. Spruner's Historico-Geographical Hand Atlas. By purchase. Atlas showing the Monthly and Yearly Isotherms, on the Polar Projection. By H. W. Dove. 1864. By purchase. Four Admiralty Charts. Presented by the Hydrographic Office. Memorandum on the Country of the Turcomans, with Map. By R. Michell. 1873. Presented by Sir H. C. Rawlinson, K.C.B. Map of Austrian Silesia. By E. Czermak. 1872. By purchase. Central Rhineland. 16 sheets of the Map published by the Middle-Rhine Geological Society, with descriptive pamphlets. By purchase. Atlas of the Netherlands and its Foreign Possessions. By J. Kuyper. 4th Edition, with letter-press. 1872. By purchase. Commercial Atlas of the Netherlands. By J. Kuyper. 7 volumes with letter-press. 1872. By purchase. Map showing Routes from the Russian Territory to Khiva. By H. Kiepert. 1873. By purchase. 72 French Government Charts. Presented by the Dépôt des Cartes et Plans de la Marine. Paris. Map of Sicily, on 48 sheets, with Index. Road Map of Italy, on 6 sheets. 1868. 4 sheets of a Map of the Province of Naples. 20 sheets of a Map of Sardinia. Six Specimens of Photo-cartography. Presented by the Italian Government through H. Parodi, Commandant (by application). Map of Denmark, showing the Distribution of Woods. By purchase. Part 2 of an Historical Atlas of Ancient Geography. By Dr. Smith and Mr. Grove. Presented by J. Murray, Esq. Map of the Grand Duchy of Finland. 1840. Map of the Grand Duchy of Finland, on 30 sheets. 1872. By purchase. Topographical Maps of the Cities of Berlin, Potsdam, Cologne, Magdeburg, and Breslau, on 5 sheets. By purchase. 281 sheets of the Prussian Survey Map on the scale of $\frac{1}{100000}$. By purchase. Map of Asia, on 4 sheets. By H. Kiepert. 1872. By purchase. Hand Atlas. By H. Kiepert and C. F. Wieland. On 67 sheets. 44th Edition. By purchase. Two of the Residence Maps of Java, on 12 sheets. By purchase. 27 sheets of Scheda's Map of Austria; scale, $\frac{1}{576000}$. Plan of Vienna in 1873. Ethnographic Map of the Austro-Hungarian Monarchy. By C. F. von Czoernig. 1868. Railway Map of Austria and Hungary. 1873. Geological Map of Austria, on 9 sheets. By W. Haidinger. 1845. Map showing Coal-fields of Austria. By J. Pechar. Geological Map of Styria, on 4 sheets. By Dionys Stur. 1865. Map of Europe, on 25 sheets. By J. R. von Scheda. 7 sheets of a Geological Map of Austria, on

12 sheets. By F. R. von Hauer. 1867. Navigation Chart of the Danube. By the Austrian Statistical and Administrative Bureau. 1859. Six parts, containing 87 sheets. 54 sheets of an Administrative Map of Lower Austria. By the Topographical Society of Lower Austria. By purchase. Sheets 6 and 7 of the Government Survey of Queenstown (South Africa). Presented by F. H. J. Orpen, Esq. Map of Northern Sweden, on 2 sheets. By A. Hahr. 1871. By purchase. Geological and Topographical Atlas of Teneriffe. By K. v. Fritsch, G. Hartung, and W. Reiss. By purchase. Geological Map of Switzerland, on 4 sheets. By M. M. B. Studer and A. Escher. Nine Maps of the Swiss Cantons. Archæological Map of the Canton of Zurich. By Dr. F. Keller. 4 sheets of a Map of the Canton of Vaud, on 12 sheets. Published by the Topographical Commission of Vaud. By purchase.

The President said Lieutenant Grandy, in charge of the Congo Expedition, with 20 Kroomen, was by the last accounts (17th or 18th February), about to proceed from Loanda into the interior, to San Salvador, where he would remain for a month or two, on account of the rainy season, as well as to acquire information and complete arrangements. Everything promised well. With regard to the East African Expedition, reports had been received from Sir Bartle Frere, dated as late as the 27th March, giving full details of what had been already done, and what was in progress. The expedition had been doubled. Lieutenant Cameron and Dr. Dillon were the only two who had accompanied it from this country; but a highly accomplished officer, Lieutenant Murphy, of the Royal Artillery, had volunteered to join them, and Sir Bartle Frere had obtained permission from the Government of India to accept his services, he continuing to draw full pay, the whole amount of which he had offered to contribute towards the expenses of the expedition, while engaged on it. At the last moment Sir Bartle Frere had also given permission to young Mr. Moffat, a nephew of Dr. Livingstone, and grandson of the well-known Dr. Moffat, to accompany the expedition. He was thoroughly acclimatised, and was reported to be a strong, active, energetic young officer. In case of the others falling sick, no doubt his services would be most valuable. The first march into the interior from Bagamoyo, had been made, and letters had been received from Lieutenant Cameron and Dr. Dillon, to the following effect:—

"*To the Secretary R.G.S.* "Livingstone East Coast Expedition,
"Sir, "March 23rd, 1872: Kikoka.

"I have the honour to report that the main part of the Expedition will start from here to-morrow.

"We have had great difficulty in obtaining passage, &c., owing to the vexatious opposition of the lesser Arabs, who have prevented gangs of ten or twelve men at a time from joining us.

"From all accounts the country in front of us is in a very disturbed state; but I think, with tact and discretion, we shall be able to weather all difficulties, especially as our askari seem a very decent set, and most of the pagazi seem cheerful and inclined to work. I would now suggest that a party should be sent to meet us, to rendezvous on the equator in longitude 35° or 36° E., about the end of June or begining of July 1875. We are fully supplied up to that time, and a good party coming up from Mombasa, viâ Kilima-Njaro, and

Kenia, would be able to open up a new country, and would also enable us to make the coast about Brava or Port Durnford, so as to take up the unfortunate Baron Von der Decken's explorations on the Juba River. Of course, all this is subject to the approval of the President and Council.

"A Mr. Campbell has been with us some days, who I think would be admirably fitted for the work; he has been some two or three years travelling in the diamond fields and Southern Africa, and he has also seen our work, and I have pointed out to him what our mistakes have been. Everything for any future expedition, except trading stores, such as cloth, beads, and wire, should be purchased in England, provisions, &c., included. The best tent would be one of Edgington's three-poled ones, with the alterations I have pointed out to Mr. Campbell.

"Mr. Campbell is on the point of going home in order to take his degree, and would be accompanied by his brother, who has been surveying and exploring in Australia, and is now at the diamond fields. The stores we should require would be a few pairs of boots, some flannel shirts and trousers, another watch and sextant, and some mercury and stationery. The relief expedition should be supplied with barometers, &c., for ascertaining the heights of the mountains they would pass, and also instruments for a rough survey, so as to be independent of us in case of our not meeting.

"Although a great deal of money has been expended, I do not think that more than $50 or $60 has been wasted owing to our inexperience. Cary should be told that the workmanship of Captain George's large artificial horizon is very defective, both in the casting and turning; I think it would be far better if they were turned out of wrought iron or brass.

"The sextants also were very much out of adjustment—much more so than could be accounted for by the passage out; and also, although the boxes for them were ordered to be made so as to allow the vernier to be clamped at any part of the arc, it has not been done.

"We have had a great deal of difficulty about the pack-saddles for our donkeys. If any future expedition intends using donkeys,—pack-saddles, bags, and all the necessaries, should be sent out from England, the only thing left to be done out here being the final stuffing. We have had a great deal of work, trying different patterns, &c., and, by dint of hard labour, have at last, I hope, succeeded; but 9 or 10 hours' sewing, with the thermometer at 97° in the shade, is not pleasant.

"Lang's guns, &c., are perfect, and so are Rouse's boots; but Maynard Harris's work is regular slop stuff. Nothing that was not tried on before starting fitted, and we had to have them altered at Zanzibar. Darby and Gosden's medicine chest and medical stores are all right.

"I intend to wait, either at M'bume or Unyanyembe, for Messrs. Murphy and Moffat, and hope and trust that all expectations regarding us may be realised. We are all starting the best of friends, with an earnest intention to do our best, and intend to pull through everything.

"H. LOVETT CAMERON, Lieut. R.N."

"DEAR MR. MARKHAM, "Kikoka, March 13th, 1873.

"This being probably the last opportunity I shall have of sending letters to England, and having, I may say, fairly started for the interior, I take that opportunity of letting you know how affairs have progressed. You will doubtless have heard from Cameron that we received little or no assistance (indeed I may say we were opposed by them) from the Arabs, Banyans, or Hindús. We had trouble with them on several occasions—claiming men who engaged to go with us, either as their slaves or debtors. It required all the patience human beings are usually gifted with to endure their never-performed, oft-repeated

promises; certainly pagazis were everywhere said to be scarce, but those people could have given us some little assistance.

"In order to make some show of a start, we formed camp about 3¼ miles outside Bagamoyo, at the Shamba Gouna; but here we found it quite impossible to keep our pagazis together, the vicinity of the town and its allurements being temptations greater than the men could stand. Cameron therefore thought it best for me to start for this place, 14 miles from Bagamoyo, and on the 11th I left with 82 pagazis and 13 askari, including the redoubtable 'Bombay.' The only difficulty encountered was the muddy inlet, where Stanley built his bridge—this same bridge, or the remains of it, being indeed the principal cause of delay, as the askari endeavoured to complete it and lead the donkeys over it; failing in this, the very simple plan of laying the reeds, which here grow in abundance, on the mud—always adopted in such cases in South America, and I daresay everywhere—answered all the purposes required, and the donkeys walked across as if on dry land. After being ferried across the Kingani, I camped on the northern bank, having shot two hippopotami *above* the ferry, not one being visible at it. On the following day, having received 13 more loads, I gave orders for breaking up camp at 1 P.M., and at 1.30, so well did the men work, all being new to their loads, we were fairly on the march. One pagazi had bolted during the night, but was brought to camp today and punished.

"The rainy season has fairly begun, but Dr. Kirk hopes we will not have any serious downfall for the next 12 or 15 days. Dr. Kirk has very kindly lent us every assistance in his power; and through his influence we were mainly enabled to procure our present number of pagazis, about 140.

"We have had much difficulty about our pack-saddles, having no one acquainted with the palm and needle; those used in the little journey to this place, made by the askari, under the constant surveillance of Murphy—whose experiences, in the Artillery and during the Abyssinian campaign, in the management of baggage animals, as also his surveying abilities, will no doubt be of the greatest service to the expedition—have answered remarkably well. As carriers are so very difficult to get, Cameron thinks of leaving some of our stores, about 30 or 40 loads, to be sent after us to Laboro, where no doubt we shall also find great difficulty in finding pagazis.

"The Peres of the French Mission were very kind and attentive to us during our stay at Bagamoyo, and paid us a visit at our camp at Gouna, or Ballyhagerty, as Murphy has named it. We have had much thunder and lightning lately, and heavy rains; 95 inches fell in about one hour and a half, and during the heaviest part of the shower our tent came down, burying us for a few minutes. The ground being very sandy, the pegs would not hold. The tent supplied by Edgington was badly packed, and a large portion of one side is ironmoulded and rotten; indeed it has not the look of being a new tent. The bell-tent, however, does very well, not admitting the least rain.

"Cameron was a little seedy on the day I left, but is now quite well again. Except for the rain, I quite enjoy the climate.

"H. G. Dillon."

It would thus be seen that Mr. Moffat was expected to join them, and that, notwithstanding the rainy season, they hoped to proceed into the interior by the end of March, so that no doubt they were well on their way to Unyanyembe by this time. Everything promised well, so far. The head of the German Congo Expedition, Dr. Gusfeldt, was expected in England in the course of the following month, accompanied by Dr. Bastian, the President of the German Geographical Society. They were all actuated by the same desire, viz., the progress of scientific knowledge, and it was therefore extremely gratifying to

know that these German Geographers were coming over to confer with the Royal Geographical Society of London. He would now call upon Capt. Sherard Osborn to communicate his paper on Arctic Exploration.

On the Probable Existence of Unknown Lands within the Arctic Circle. By Captain SHERARD OSBORN, R.N.

IT is a well-accepted axiom in the exploration of the Arctic Seas, that if lands can be found, whether continuous or adjacent to one another, in any given direction, that the possibility of tracing them either by ship, boat, or on foot with sledges, becomes a certainty; and that the risk of being caught in the drifting ice, and so being swept out of the Arctic Circle, is proportionately diminished.

If the student of Polar geography will take a globe and turn the North Pole towards himself, he will be struck by this remarkable fact: that, of the three continents of Europe, Asia, and America, which environ the North Pole, they none of them approach it within the 70th parallel of latitude, except that promontory of Asia in about 105° E. long. between the Obi and Lena rivers. With that exception, those continents all stop abruptly short about the 70th parallel, forming as it were the edges of a vast crater in the earth's surface,—that crater being the Arctic Ocean, approximately 2400 miles in diameter, or about the distance from England to Halifax. Of all this wide expanse we know but little, and it is only at two points that seamen and explorers have been able to penetrate it to or beyond the 80th degree of north latitude—viz. at Spitzbergen and up Baffin Bay, two routes some 90 degrees of longitude apart.

Of the Spitzbergen route towards the Pole, it may be said that no one by ship or boat had ever yet gone beyond 82° 43′ N.; that at that point an interminable sea of ice * was seen extending north; that there were no indications of land beyond Spitzbergen, and that the southward motion of the ice-fields on which Parry travelled in 1828 carried him back faster than he was able to proceed northward.

Of the Baffin Bay route I will now enter into greater detail. This great bay, as it has been called, but strait as it should be really named, has been traced already from lat. 60° to lat. 82° N.,

* Parry, July 13th, 1827—obs. lat. 82° 17′ N.—says, "Mounting one of the highest hummocks, we could discover nothing to the northward but the same broken and irregular surface, and we now began to doubt whether we should meet at all with the solid fields of unbroken ice, which every account had led us to expect in a much lower latitude. The weather was remarkably clear. Our height from the level of the sea, 40 feet.

"A very strong ice blink overspread the whole northern horizon."

a distance of 1320 miles between the continent of Greenland on the east and a vast archipelago of islands extending from the north side of Hudson Bay to Grinnell Land; but in neither case, either on the one hand or the other, has the land been seen to terminate.

This archipelago of islands projects itself northward from the American continent, preserving a mean width of nearly 700 miles, and, together with Greenland, bars as it were the Polar waters flowing into the Atlantic from those whose natural outlet is the Pacific Ocean. It will be seen, furthermore, that this Arctic archipelago is nearly on the opposite meridian to the Pole of that promontory of Asia which I have before said penetrates within the 70th degree, so that the two known points of Cape Timoor in Asia and Cape Parry in Grinnell Land are within 1200 miles of each other, or halfway across the entire Arctic Ocean, thus reducing the width of the unknown area by one-half. Two American travellers, Dr. Kane and Dr. Hayes, have each at different times reached the northern part of this Sea of Baffin, the one on the east coast, and the other on the west. Both bear testimony to the two following facts.

They saw the land of this archipelago still stretching northward, and both saw open water. The contrast, therefore, between the Spitzbergen and Baffin routes into the Arctic Sea may be simply summed up again as follows:—

Spitzbergen route, in lat. 82$\frac{3}{4}$° N. A sea of ice, and no land in sight.

Baffin Strait route, in 82° N. Land extending northward, and plenty of open water.

Let us next consider the two following points:—

Are there grounds for believing that this Arctic archipelago extends much further north than it has been already traced?

Would such lands, if they do exist, be of service in a further exploration of the Polar area, and conduce to the safety or support of explorers?

My reasons for believing that land extends far to the north of any point yet reached in this Arctic archipelago are based on the following evidence. While employed in compiling from the journals of Captain Sir Robert McClure, the discoverer of a north-west passage in H.M.S. *Investigator*, I was struck with his description of the extraordinary ice met with by him in the sea west of the archipelago under consideration, and which he traced from Behring Straits up to the north-west of Banks Land, round a great curve of more than 1000 miles. I compared it subsequently with the reports of Lieutenants Mecham and McClintock, who visited in 1853 the west

shores of Prince Patrick Land; and again with the remarks of Captain (now Admiral) Collinson, who, like McClure, passed between this great ice and the American continent in his remarkable voyage in H.M.S. *Enterprise.*

All their descriptions agreed, and it was evident to me that no one who had travelled elsewhere in the Arctic regions had ever met with similar oceanic ice; and it certainly was nothing like the ice-fields found about Spitzbergen or the east coast of Greenland, as I will presently show.

Its character I often discussed with the able navigator of Sir Robert McClure's ship, the late lamented Stephen Court, who was subsequently my navigating officer for two years in H.M.S. *Furious.* From his statement I can safely describe this western ice as a vast floating glacier-like mass, surging to and fro in an enclosed area of the Arctic Sea, bounded on the south by the shores of North America, on the west by Kellett and Wrangel Land, on the east by the Arctic archipelago under consideration, and on the north—and there is the query. But if there was space for it to move north, there is no question but that the furious south storms which sweep over the North American continent would blow it far in that direction, and bring its masses down into the Atlantic by way of Spitzbergen, whereas, as a matter of fact, it never went more than a few miles off the American coast, leaving a narrow belt of water; and directly the gale ceased it surged back again, with its edge grounding in 100 feet of water. The same phenomenon occurred along its eastern edge, where this great ice-field impinged on the archipelago in Banks Land. There, under the most favourable circumstances, the ice never moved off more than a mile or two, and in most places came home against the cliffs, leaving hardly the width of the *Investigator* to go past the edge of it, aground sometimes in 12 or 15 fathoms water, showing a thickness of 70 or 80 feet. Mecham and McClintock found it on the west coast of Prince Patrick Island, pressed up with tremendous energy on those low shores, and forming in places such a barrier, especially on the south-west extreme, as to oblige Mecham to take his sledges landward, to avoid the insurmountable barrier the broken floe edge had there formed.

This ice, as described to me, consisted of vast continuous fields, whose thickness below water was more than 60 feet, whilst the surface resembled hills and dales of rounded outline, studded close together; the major portion of these hillocks, 30 or 40 feet in height above water, and some of them as much as 100 feet, packed so close together from the effects of alternate snow, thaw, and frost,

that there was scarcely sufficient footing to be found amongst them. And in proof of the extraordinary age of the ice-fields, these hillocks were found to be pure, fresh-water ice, indicating the long period that the snows had fallen on the surface of that frozen sea.* This ice must not be confounded in any way with what is called "packed ice." It was far too heavy and massive to be broken up in that manner, and it was only along its edge that fragments were found broken off by contact with the cliffs or shore. These fragments, as far as is known, form great ice-streams, which pour through Behring Straits and Barrow Straits, though much broken up and reduced in thickness long before they had been met with by our navigators. We saw very little of this ice in Jones' Sound, the entrance being there barred by Prince Patrick Island and the lands which lie north of it.

In one place, just north of the Mackenzie River, the *Investigator* stood in a thick fog up a sort of cleft 90 miles long in this great ice-field. McClure found the sea gradually deepening as he advanced, but the sharp ice edge was higher than the gunwales of his ship, and he escaped by a miracle before it closed on him, and gladly retraced his steps to its outer edge.

I have said thas this ice is not met with on East Greenland and North Spitzbergen, and my authority is, first, that of the late dis-

* Commander McClure, off Point Warren. Between Point Barrow and the Mackenzie:—

"*Investigator*, 24th Aug. 1850.

"I took the height above the water in seven places, which gave an average of 11 feet 11 inches; a pack chiefly composed of such would be too powerful a foe for any ship long to contend against."

"Cape Prince Alfred. North-west coast of Banks Land:—

"To prevent being carried away with the pack which was filling up its space, we secured to the in-shore side of a small but heavy piece of ice, 72 feet thick, grounded in 12 fathoms, 74 yards from the beach."

"We were now setting fast upon another large piece of a broken floe, 54 feet thick, grounded in 9 fathoms upon the *débris* formed at the mouth of a large river."

"Surrounded with masses of ice, 16 and 18 feet thick, while the grounded floes are from 40 to 67 in depth."

"Our day's work did not exceed 15 miles, when we were compelled to make fast to the land ice, which along the whole of this coast is of the most massive and terrific dimensions I have ever witnessed. There was little selection of berth on a coast-line nearly straight; but a slight indentation, protected east and west by two large pieces of a broken floe, 30 feet above the water, gave hopes of some shelter."

"Indeed, since rounding Cape Austin it had lost much of its terrible aspect, which led to the inference that we were fairly in Barrow Strait, and that the main Polar pack takes a direct line from the last-mentioned cape to the E.N.E.; and that which fills these bays, and is carried down Barrow Strait, is the comparatively small ice which drifts from its southern edge, as we have invariably remarked that there is a decidedly eastern current, which impels the enormous Polar floes on that course, while the lighter, influenced by wind, is oftentimes setting in an opposite direction."—*Official Report to Admiralty.*

tinguished President of the Royal Society, General Sir Edward Sabine, who in his work on the voyage he made in 1825 with Clavering to East Greenland says, speaking of the ice between Spitzbergen and it in 75° and 76° N. :—"The character of the field ice was heavier than that which occupies the middle of Davis's Straits and Baffin's Sea in the early part of the navigation, but was not so heavy as the field ice in the neighbourhood of the Georgian Isles (Melville Island)." *

Parry says, in his boat journey of 1827, "Lat. 82° 26′ N. The floe not more than 4 feet thick;" and in lat. 82° 32′ N., he remarks, "the floes were larger to-day, and the ice of heavier dimensions than we had yet met with; but the general thickness of the floes did not exceed 9 or 10 feet, which is not more than the usual thickness of those in Baffin's Bay and Hudson's Strait, while it is a great deal less than the ordinary dimensions of the ice about Melville Peninsula, and not half the thickness of that towards the western extremity of Melville Island." Near his extreme point he remarks that the largest floe was then from 2½ to 3 miles square, and from 15 to 20 feet thick, and that that ice was the heaviest he met with, before he had to turn back in consequence of finding that the southerly drift of the ice gave him no hope of being able to attain 83° N., much less the Pole.

With this data before us, and the certainty that none of those who have been up Barrow and Jones Straits have ever seen anything but small fragments of this ice; with the certainty that nothing like it ever comes down into the Atlantic by way of Spitzbergen—for a twenty-feet-thick ice-field there is considered very heavy ice; with the certainty, too, that it was not met with at the head of Baffin Straits by either Kane or Hayes—surely I shall not be considered a mere theorist if I assert that this true "mer de glace" west of the archipelago is land-bound on its northern edge, and if so that the archipelago must sweep up very near the Pole of our earth, if not across and beyond it.

Apart from the ponderous character of this "mer de glace" leading me to the conclusion that it is formed in a land-locked sea, there is additional data, namely, that of the direction and the amount of tide on its shores. For of course, as in the Mediterranean and Black Seas, an enclosed area of salt-water, with only a narrow outlet to a great ocean, has generally but slight rise and fall of tide.

We find at Kotzebue Sound and Point Barrow, in Behring

* See page 421.

Straits, where Moore and Maguire wintered in H.M.S. *Plover*, that the flood tide came from the Pacific, and the rise and fall was only 2 feet at the former, and only 7 inches at Point Barrow.

McClure, in the Princess of Wales Strait, found the flood-tide coming from the south, with only 3 feet rise and fall on spring-tides. At the Bay of Mercy, Banks Land, the flood, such as it was, came from the east up Barrow Strait, with only 2 feet rise, agreeing much with all other observations taken up Barrow Strait, viz. at Beechey Island, Cornwallis Island, Leopold Island, and Melville Island, at which places the flood evidently came from the Atlantic, *viâ* Baffin Bay, diminishing as it approached the sea, west of the archipelago.*

In Jones Strait the flood-tide likewise comes from the east, as Admiral Richards and I had good proof of in a boat expedition during the autumn of 1852; and we both found, as we went westward along the north shore of the Georgian or Parry group, that the tides, as indicated by the ice-action upon the shore, diminished likewise as we went west.

Now, if the area of sea west of this archipelago was not land-locked, but opened into the general space called the Arctic Ocean, I think seamen and geographers would agree with me that the tidal wave of that vast area, as compared with the limited one of Baffin Strait, would cause the flood-tide to come from it into, at any rate, the west entrance of Barrow Strait and Jones Sound, whereas the evidence I adduce shows that the flood travels towards this sea, which I say is enclosed by land, instead of from it, as would otherwise be the case. The best parallel I can give to the tidal observation of Barrow Strait, is that of the Strait of Gibraltar and the Cattegat, where the flood-tide flows into two enclosed seas from the Atlantic Ocean.

Apart from the tideless character of the sea west of the archipelago leading me to the belief that it is land-locked to the north, and has no communication with that portion of the Polar waters which flow into the Atlantic, there is another corroborative fact. The two great Polar currents by which that enormous amount of ice discharges itself into more southern latitudes comes from two

* In Barrow Strait the flood comes from the east with a rise and fall at Port Leopold and Beechey Island of about 7 feet on the spring-tides. This tide by the time it has reached Melville Island diminishes much in velocity, and at Winter Harbour shows only a mean rise of 3 feet.

With reference to the Pacific tide, Admiral Collinson's observations in H.M.S. *Enterprise* show that it reaches to about the same meridian, viz. 120° w. long., along the shores of North America; agreeing remarkably with the tidal observations of McClure, Parry, and others, making that meridian the point at which the Pacific and Atlantic tides meet.

opposite directions. The ice formed north of Spitzbergen and Nova Zembla discharges itself by a south-westerly current, of which there is ample evidence, and the rate, according to the seasons, varies from 8 to 13 miles a day.* On the other hand, the ice from what I believe to be an enclosed sea, west of the archipelago, discharges itself for the major part in a south-easterly direction, of which we have had practical proof since 1850 in the drifting out to sea in Davis Straits of the four expeditions when beset, of James Ross, De Haven, Kellett, and M'Clintock; the only exception to this south-easterly current being a small amount of much disintegrated ice, which escapes southward into the Pacific through the shallow strait of Behring. The only way I can account for two diametrically opposite currents flowing from that Polar area before us is by assuming that they flow fromtwo spaces of water separated from each other.

I have, therefore, not the slightest doubt that, whether this Arctic archipelago be followed to the north, or the recently discovered lands north of Siberia near Behring Strait be traced; we shall find that they are nearly connected one with the other; and in doing so, the exploration of the Polar area will be thoroughly and successfully accomplished.

Let me now point out in what way these lands, if they exist, give good promise for future exploration.

In the first place this archipelago abounds in harbours and creeks where a ship can find shelter, having pushed during the summer season as far as navigation can carry her. She then secures a base safe from the ever-southerly drift of winter ice. From such a position in early spring, sledge parties, on the system introduced by my distinguished friend Sir Leopold M'Clintock, can be pushed forward to the utmost limits of men's physical powers. Secure in a harbour, those on board the ship can pursue those scientific researches on shore which have hitherto been so much lost sight of in Arctic exploration, and also avoid the horrors of wintering in the pack, which have been testified to so vividly even in our

* "Ships, which have been beset in ice between Spitzbergen and Greenland, have been found to drift to the s.w. and s.w. by s., at the rates of 182 miles in 13 days; 120 miles in 9 days; 420 miles in 50 days; and 1300 miles in 108 days; or at an average rate of about 13 miles a day, with the exception of a third instance, which gives 8 miles a day, but still in a south-west direction.

"This south-westerly current, however, does not appear to reach below the parallel of Cherie Island in the east, nor to extend as far as Cape Farewell in the west, and certainly not beyond it; for a south-easterly current has been found to prevail there, from the fact of bottles, which were thrown into the sea in those parts, having been picked up on the shores of Great Britain and Teneriffe."—Extract (p. 341) from the 'Voyage of the *Dorothea* and *Trent* in 1818.'

time by Sir George Back, Sir James Ross, Captain De Haven, and Sir Leopold M'Clintock, not to speak of the still more disastrous experiences of our German brethren in the *Hansa*.

Furthermore, if any untoward accident should befall a ship in any part of this archipelago, I have no hesitation in saying that, with our present knowledge and appliances, any naval leader would be utterly unworthy of his post who could not so arrange his communications with the Danish settlements in Baffin Bay as to carry his party back there in safety; and I unhesitatingly assert that none of these elements of success and safety for a Polar exploration exist on the route favoured by German geographers in pushing northward through a mere sea of ice from Spitzbergen.

There is another point, too, in connection with the advisability of an Arctic exploring expedition keeping hold of the land wherever it is possible; and that is, the proofs which have gradually accumulated that in every land of this Arctic archipelago there are resources in the way of animal life which, if properly sought for, will do much to preserve the health and strength, if not save the lives, of future explorers.

Both shores of Baffin Strait, as far as they have been explored, prove to abound in animal life.

Within a few miles of where Kane tells us his harrowing tale of the craving for fresh food amongst his people which induced them to feed upon vermin, Hayes found abundance of reindeer, seal, and walrus. To use his own words:—

"The whole region round Port Fulke, at the entrance of Smith's Sound, is teeming with animal life, and one good hunter would feed twenty mouths; the sea abounds in walrus, seal, narwhale and white whale; the land in reindeer and foxes; the islands and cliffs in summer swarm with birds, and the ice is the roaming ground of bears."—P. 420.

Morton, who reached the extreme north visited in this direction of Greenland, found open water in June alive with birds. On the west shore, whalers, as well as Hayes, have seen both deer and musk oxen; and I could fill a chapter with facts to show that our recent explorers over the whole of the Parry group have had slowly revealed to them the fact that there is hardly one of those islands in which, had we known it, and had a better system of hunting parties been organised, we could not have added largely to our comfort and resources. One illustration may suffice.

From that very Melville Island that Parry visited in 1820, and did not obtain a day's rations for his crew, Captain Kellett, in his last winter there, drew 10,000 lbs. weight of fresh venison and beef from a very limited area; and whilst we in Northumberland Sound

never procured one fresh meal, Captain Richards and I, as we landed in the grey light of a March afternoon on Bathurst Island, saw, to our astonishment, large herds of deer feeding on its snow-covered terraces, and I subsequently saw plenty more of them.

There is one more argument in favour of the Baffin Strait route, which is, that along its shores, on both sides, human beings, in the shape of Esquimaux, are able to exist, and have been seen, or very recent traces of them, as high as the land has been visited.

They are everywhere found well disposed, and will be useful as hunters and fishermen, and there is no reason, from their own account, to doubt their existence still further north than Europeans have yet been.

In the words of Kalutenah, an old chief of a tribe near Cape Alexander:—"There are good hunting grounds at the north, plenty of musk ox; and wherever there are good hunting grounds, there the Esquimaux will be found."

I hold that, amongst the many interesting questions which the exploration of the Polar area will, in the interest of science, yield a solution, there is nothing more curious, from an ethnological point of view, than tracing human life up to the Pole itself, not to speak of the assurance their existence gives of the possibility, worst come to the worst, of our explorers being able to live where their fellow-creatures are to be found; in illustration of which I would point to the case of the American, Mr. Hall, who lived amongst Esquimaux, as an Esquimaux, for nearly six years, and has again recently returned undaunted to share the lot of this northern race.

I have now laid before you my final reasons for adhering to the opinions of the Arctic Council of the Royal Geographical Society for preferring the route viâ Baffin Bay towards the unknown area which lies around the northern pole of our earth, and for urging on our Government this route as the right one for a public expedition next year; at the same time I beg you will not consider me, though an advocate for this route, to be the opponent of any other which individuals may be ready to venture upon, whether by Spitzbergen or from Behring Strait. I only desire to see a naval expedition go where such thought and reasoning as I am able to bring to bear on the subject tell me the greatest amount of scientific and geographical knowledge will be acquired, with the minimum amount of risk for those who are employed in it.

No one can honour more deeply than I do the enterprise and love of exploration which induces men like Mr. Leigh Smith to attempt with their own resources to penetrate the mysteries of that frozen sea north of Spitzbergen; and if he fails, or comes back empty-handed,

I feel sure that no Fellow of this Society will sneer at his enthusiasm, cavil at his reasoning, or blame him for want of results.

But with a Government expedition, despatched, as I trust it will be, under the advice not only of this Society, but that of every learned and scientific body in Great Britain, it is all important that it should not prove a failure, return empty-handed, or end in a catastrophe.

It is to guard against these eventualities that the Arctic Committee of our Council did so wisely, I think, in recommending the Baffin Bay route as the right one for Polar exploration; and I rejoice that the President and Council have so unanimously adopted it.

Admiral Sir G. Back said it was quite possible that the ice to the north of Behring Strait was land-bound, for from the extreme north of Parry's furthest latitude there was ample room and space enough for hundreds of islands, against which the ice might accumulate. When Sir John Franklin and himself went from the Mackenzie River toward Behring Strait, they saw a considerable quantity of old ice, which drew too much water to approach the shore, that was more or less encumbered by drift ice of formidable dimensions. Some idea of the pressure of that old ice was afforded by the fact that two small icebergs had been forced high on the beach, on the inner ledges of which, some 20 ft. above the base, portions of gravel and shingle were deposited. They had great difficulty in deciding as to the direction of the flow of the tide, not only there, but also between the mouth of the Coppermine River and Point Turnagain, and ultimately they came to the conclusion that it was from the east, with a rise and fall of eighteen inches or two feet. He had not the slightest doubt that Smith Sound would be the best route for further exploration, and would afford the best results to science. He was with Franklin in the Spitzbergen seas in 1818, and the deepest ice seen on that occasion, on a floe of four miles in diameter, was 42 ft., but that was an extraordinary thickness. He trusted that the Government would be more liberal-minded in 1874 than in 1873, and would be induced to fit out a polar expedition in full accordance with the recommendations of the Arctic Committee.

Admiral R. Collinson, referring to the remarkable packing of the ice from Behring Straits, said by the force of the wind and the current one layer of ice became piled up upon another, until their united height was as much as 25 or 30 feet. This pressure was exerted in the winter as well as in the summer, for when Capt. Maguire wintered at Point Barrow, in the month of February, by a very violent gale the ice was blown off the land, and for two or three days the sea was clear. In the summer time, when the ice was grounded, one piece could be seen to ride over another in the most extraordinary manner. When the *Plover* anchored out in Kotzebue Bay, the ice came in and actually rode over the vessel so that they could not get at the windlass to slip their cable, but by the greatest good fortune the cable parted. He did not think, with Capt. Osborn, that the ice was land-bound, but was rather of opinion that from Behring Straits to the pole there was no land whatever. If there had been land a southerly gale would blow the ice further off the coast, but he frequently had scarcely working distance between the shore and the ice. He passed a winter in Victoria Land, and the highest tide was 3 ft., but that was an unusual height and was caused by the wind. The average rise and fall would be 18 inches. There was not a doubt that the tidal wave was seriously affected by the fixed ice which covered it. In Victoria Straits there was only 7 inches on an average, though on one occasion there was a rise of as much as

2 ft. 4 in. He also experienced great difficulty in ascertaining where the flood came from; but at the mouth of the Coppermine River, he was convinced it was from the east. He agreed with Captain Osborn that the right way to explore the northern seas was to follow the land. He believed by proceeding up Smith Sound an expedition would be able to get further north than by any other route, and with a greater probability of obtaining valuable scientific results.

Captain WELLS, R.N., said, so far from regarding the heavy ice on that part of the Arctic Sea north of North America as a proof of the existence of land still further north, he considered it as a proof of the non-existence of land. He had seen a floe north of Spitzbergen which was ten miles in diameter. The ice there was generally very flat, and might be of two years' formation. Alexander Parker, who sailed 800 miles north of the mouth of the Lena, found the ice impassable. It was perfectly natural that the ice on meeting an abrupt shore should careen over one piece upon another so as to form a barrier. It had been said that the water from the rivers thawed the ice, but he had attempted to wade through a small stream and found it icy cold, and to say that the river water thawed the ice, was an absurdity. Ice was thawed from below, while fresh water flowed on the surface of salt water. How then could the fresh water from the rivers thaw the ice from below? After what had been stated about the pressure of the ice north of America, it was impossible to suppose that any vessel could force her way through. The year before last, thirty American whaling vessels were deserted and wrecked, in consequence of the pressure of the ice. The thickest fixed ice he had seen, however, in the neighbourhood of Spitzbergen, was only twelve feet thick. He was on one occasion beset in an enormous floe with a heavy gale of wind blowing, but they were as comfortable and happy as possible, and if they had had a steamer they could have gone up to the north pole, which was clear before them, for they saw the blue cloud which always indicated water to the northward. If a vessel were beset on the other side, however, she would be lost, and the crew would have to make their way to the Danish settlements. From all the 234 books that had been written on the Arctic regions, it was well known that no party of Esquimaux had ever been seen in one place numbering as many as 100, and although game abounded in some parts, only a very small number of men could live together. The 150 men in Franklin's party were lost because their number was so great. He should be very sorry to have to leave a ship and depend for support on the game that could be obtained on the journey to the Danish settlements.

Mr. E. WHYMPER expressed himself as being strongly in favour of the scheme proposed by the Arctic Committee for the exploration of the polar regions by way of Smith Sound. He had spent a considerable time last year with Peter Jensen, who was with Hayes on his memorable journey up Smith Sound. Although he was left by Hayes upon the western shores half starved and totally disabled, and felt the effects of that journey long afterwards, he was now most ardent to join another expedition to the north pole, and he would be a most valuable assistant to any English expedition which might be despatched. Captain Osborn had pointed out that the existence of large bodies of reindeer was a strong argument in favour of the Smith Sound route, but it should be remembered that reindeer were migratory animals, and that the tameness of those which had been met with was a proof that they had not been there long. Those which Jensen saw were so tame that he shot them down like cows one after another. A ship going up Smith Sound with the expectation of finding reindeer might possibly be very much disappointed. In the parts of Greenland which he had visited there were now no reindeer at all, but perhaps in two or three years' time there might be vast numbers of them.

Captain SHERARD OSBORN said his information with regard to the floes near

Spitzbergen was obtained from Parry, who stated that the largest he met with was 2½ miles square. Hummocks were produced by the crushing together of thin ice. Those hummocks might be 40 or 50 ft. high, but it would not follow that the ice would be so thick below them. Captain Wells had misunderstood his allusion to animal life, as he had done the entire tenour of the paper read. He should be very sorry to send out a ship unprovisioned to depend upon the food obtainable in the Arctic regions, but it was a great thing to give men fresh meat even only twice in a month. 10,000 lbs. of meat were obtained from a limited area of Melville Island in one season. It might have been an accidental circumstance that Hayes found so many reindeer, while Kane, only 20 miles off, found none; but it showed, at all events, that immense numbers exist somewhere in the neighbourhood.

The PRESIDENT said it was to the advantage of geographical knowledge that such questions should be thoroughly investigated. Since the Government had declined to undertake to furnish ships for a renewed polar expedition this year, the Geographical Society had applied to the Royal Society for their co-operation; and the Royal Society had nominated a committee to confer with the Arctic Committee with a view of ascertaining and tabulating all the scientific reasons which existed for polar exploration. As soon as the joint committee had sent in its report, they would be prepared to go to the Government again; and they had great hope of success.

Eleventh Meeting, May 12th, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Colonel W. W. Anderson* (Political Agent in Kattywar); *W. A. Baines, Esq.; Commander W. Milton Bridger*, R.N.; *Edward H. Cardwell, Esq.; Jesse Chadwick, Esq.; John Coles, Esq.; Captain Frederick Elton; John Fair, Esq.* (Consul for the Argentine Republic); *R. Bishop Farrar, Esq.; Major-General John Forbes*, C.B.; *W. Freeland, Esq.* (Barrister); *Captain Grey* (Bengal Staff Corps); *Theodore Jervis, Esq.* (Barrister); *Rev. H. W. Kemp; Maurice Kingsley, Esq.; Joseph Christopher Leaver, Esq.; William Barry Lord, Esq.; Captain Marcus Lowther*, R.N.; *Robert Lydgate, Esq.; William Lydgate, Esq.; P. H. McKerlie* (F.S.A. Scotland, &c.); *Alfred P. Newton, Esq.; Rev. Robert Nimmo*, B.A. (Chaplain R.N.); *Captain Francis Lamb Philp* (Royal Scots Greys); *Edward Prentice, Esq.; James Price, Esq.; W. H. Ravenscroft, Esq.; D. Scott, Esq.; John Henry Skilbeck, Esq.; John Berger Spence, Esq.*, F.G.S.; *Sir Edward Sullivan, Bart.; Thomas P. Tindale, Esq.; Francis William White, Esq.*

PRESENTATIONS.—*R. A. Cottrill, Esq.; W. H. Ravenscroft, Esq.*

ACCESSIONS TO THE LIBRARY FROM APRIL 28TH TO MAY 12TH, 1873.—'Die Preussiche Expedition nach Ost Asien.' Vol. III.

Berlin, 1873. By purchase. 'Expedition to the Western Frontier of Egypt in 1817.' By P. Della Cella. 1822. By purchase. 'Vazeeri Rupi in Kulu.' By J. Calvert. 1873. By purchase. 'Viaggio alle Indie Orientali da Fra P. da S. Bartolomeo.' Roma, 1796. 'Five Years' Experience in Australia Felix.' By G. H. Haydon. 1846. By purchase. 'Voyage à la Martinique en 1751.' Paris, 1763. By purchase. 'Voyage de Siam des Pères Jésuites à Paris, 1786.' By purchase. 'Letter by Baron Richthofen on the Provinces of Chili, Shansi, Shensi, &c.' Shanghai, 1872. 'List of Elevations in that Portion of the United States West of the Mississippi River.' By H. Gannett. Washington, 1873.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF APRIL 28TH, 1873.—A Chart of Baffin Bay from Disko to the furthest point of Smith Sound. Presented by C. R. Markham, Esq. Map of North-East Coast of Greenland. By Julius Payer, Commander of the 2nd German North Polar Expedition, 1869–70. Presented by C. R. Markham, Esq. An old MS. Map of the Narrows of the Orinoco River, opposite Punta de San Philipe. 1764. A Map of the United States of Venezuela. By Bonifacio Coronado Millan. 1871. Through A. Jenoure, Esq.

In opening the Meeting the PRESIDENT remarked that Mr. Ney Elias, the author of the paper about to be read, had made a very remarkable journey, and was probably the only Englishman who had passed through Mongolia from east to west, throughout the entire distance from China to Central Siberia.

The following Paper was then read :—

On a Journey through Western Mongolia. By Mr. NEY ELIAS.

[ABSTRACT.]

THE disturbing influences of the Mussulman Rebellion, since the treaty of Tientsin, have hitherto rendered impracticable all attempts to penetrate Zungaria from the side of China; even the Roman Catholic Missionaries, well acquainted as they are with the customs and manners of the insurgents, have failed to push forward their mission, and we are thus dependent upon the narratives of the old travellers for our knowledge of this region; narratives which, although as trustworthy as could be expected at the time, fall far short of what might be done with modern appliances. Explorations have been made in Eastern Turkistan by English explorers, but the ranges of the Thian-Shan, the countries north and south of them, and the great southern desert, with its buried cities and ancient roads, as well as the countries lying west of the Pekin and Kiachta roads, are comparatively unknown.

Mr. Elias had, therefore, a wide field for exploration when he started from Pekin in the summer of 1872, with but one Chinese attendant, on a journey not devoid of personal risk. The identification of the site of the ancient city of Kara-koram, was one of the chief objects of Mr. Elias' research. The routes formerly taken by the Chinese caravans having been rendered impassable by the predatory Mahomedan hordes, the only means possessed by Chinese merchants and officials of reaching the remote settlements of Barkul and Hami, is by crossing the Gobi to Uliassutai, and thence recrossing to Barkul.

Having heard that a Russian caravan, with a strong military escort, was about to proceed from Kuldja to Urumtsi, to attempt to open up trade with the inhabitants, the author conjectured that the presence of a powerful Russian party at so central a point might enable him to reach the latter place from Barkul. On July 22nd he left Pekin for Kalgan, to obtain camels for his journey, but failed to hire or purchase any either there or at Si-ying-sze, the next station, the drivers fearing to proceed through tribes unknown to them. Si-ying-sze is one of the posts of the Belgian Mission, from whom the author received great kindness. The mission is confined to the territory occupied by the Chinese emigrant agriculturists, lying immediately outside the Great Wall. Wheat, oats, millet, and poppy are chiefly grown in these settlements; the latter being the principal inducement to the immigrants to leave their native province; it is said to be entirely consumed in the neighbourhood in which it is grown. Little reliable information could be obtained concerning the quantity cultivated, but it was admitted, on all hands, that opium-growing was the most profitable trade in Mongolia, notwithstanding the heavy taxation. The road to Kuei-Hwa-Cheng, 150 miles distant, and the terminus of the Uliassutai and Thian-Shan trades, leads over a somewhat mountainous grass-land. About 40 miles from the town, a pass some 5800 feet high is crossed, after which a descent takes place to the head of a valley formed by a division of the elevated mass into two distinct chains: the soil here was composed of a species of loam or "loess," light, friable, and of a yellowish brown colour, full of rifts and fissures, sometimes 30 feet deep; the hills on either side being composed of the same material, and containing in their sides whole villages of cave houses, occupied by the owners and cultivators of the adjacent land. Kuei-Hwa-Cheng was reached on the 17th of August, the author being detained there three weeks before he could obtain pack-camels. It consists of two distinct cities, occupied by the civil

and military governors respectively, and possesses a large export trade in tea, flour, millet, and manufactured articles used by the Mongols, who return in exchange live-stock and skins. Having been for hundreds of years the eastern gate of the desert, it is pervaded with a peculiarly Western Asiatic air; the caravans of the Western Mahomedan nations coming and going, leave behind traces of their national characteristics, many of the most influential families being Mahomedan, though Chinese in language and many other respects; the style of houses, in some instances with small gardens in front, differing from anything generally seen in the interior of China. During his stay here Mr. Elias paid a visit to the nearest point of the Yellow River—at the port of Hokow—with a view of observing the difference of altitude between the two places, the result giving 3300 feet for the Yellow River, or 250 feet lower than Kuei-Hwa-Cheng.

When at Lung-Mên-Kou in 1868, he found the level of the diverging point of the old and new beds to be about equal with that of the sea; thus the whole of the above difference is contained in the space of some 800 miles, showing a fall per mile of over 4 feet. In the height of the flood season, with its velocity increased to its greatest proportion, and with the whole of the above fall taking place before reaching the great plain, some 400 geographical miles above its mouth, it must have required great skill and vigilance to control. Hokow is a busy little town, where there is a great quantity of coal, mostly in large blocks, and of a hard slaty nature.

Having returned to Kuei-Hwa-Cheng, a fresh start was effected, passing by way of Ku-ku-Ilikung, the last of all the Chinese settlements as the desert is approached.

There are two tracks from Kuei-Hwa-Cheng to Uliassutai—an official track and a caravan track: the former consisting of stations or encampments subsidized by the Chinese Government; the latter a mere line of camel and pony foot-prints, leading through a series of Mongol encampments, but, being the more westerly, was selected by the author as being the most likely to lead him near the objects of his expedition.

In addition to his servant, Mr. Elias was now accompanied by the driver of the camels he had hired, and a native of Shansi as guide and interpreter, with seven camels and two ponies, changing the latter with the Mongols from time to time, as occasion required, giving an equivalent in addition. The distance performed per diem averaged 18 miles, but later on, as the camels became fatigued, only 15 miles. The Mongolian Steppes possess but little variety of scenery or incident to the traveller.

The Toumet tribe was the first passed through. They are a civil, well-disposed people, possessing flocks of sheep and goats in small numbers. Several specimens of rocks were collected, chiefly forms of agate and chalcedony. The general aspect of the desert is that of low hills or downs, with valleys and plains intervening,—more of a stony than a sandy nature,—here and there intercepted by low rocky ranges, with scarcely any grass.

The author found it useless to record the names of the Mongol villages and encampments passed; their sites being constantly changed, by being carried off on the backs of a few camels to more favourable localities. The best pools of water are to be found in or near the rocky ranges of hills that intersect the desert at intervals; the water in them being always sweet, whilst in those on the plains it is frequently brackish.

A difficulty in obtaining water and pasturage, added to perpetual squabbles between the camel-driver and guide, did not add to the comforts of the journey.

On October 8th the River Onghin was reached, where an observation for longitude was successfully accomplished by a set of lunar distances east and west; observations for latitude having been made at short intervals throughout the route.

The direction of the Onghin, as far as could be ascertained, is from north-west to south-east, and the natives assert that it continues to flow in the latter direction for about 80 miles, then losing itself in the desert. Up to this point all inquiries regarding Kara-koram had proved fruitless, but he was now told of an ancient city on the banks of the Tui, distant only a few days' journey towards the west, and which he determined on visiting on his way to Uliassutai.

Turning westerly along the southern slopes of the rugged Kangai Mountains, formed of masses of red and grey granite, on the 16th the Tui was reached. The night after leaving the Onghin, the guide and interpreter absconded, with the best camel and a quantity of flour and millet, and the party being thus deprived of the means of communicating with the Mongols, became to them objects of suspicion and ill-will, and the remaining 350 miles to Uliassutai remained to be accomplished under considerable difficulties.

Within a mile of the right bank of the Tui, and close to the track followed, were found the ruins of the ancient city or fortress which had been heard of at the camp on the Onghin. It consists of a mud-brick wall and moat (now dry) about 250 yards square; it has two gates and four bastions, one at each corner, the gates being like those of all Chinese cities, forming on the inside a

sloping way to the top of the wall. One of the buildings within the wall had apparently been a temple, and measured nearly 100 yards long, and about 40 or 50 broad. No inscriptions could be traced. From inquiries subsequently made, this ruin was ascertained to be that of a Chinese trading town that existed up to 80 or 90 years ago, and was abandoned owing to the difficulty of obtaining fuel. For many reasons it cannot be Kara-koram.

The River Baitarik, farther west, is the largest and most powerful of the Kangai streams; the water is clear and sweet, with a general direction from north to south. The country east and west is rugged and barren, with large numbers of wild ponies and asses in mobs of from 20 to 30. On the 25th October camp was formed on the left bank of the Chagan-Tokoi, which takes its rise in a chain of mountains north of the route, and flows thence first s.s.w. and then w. parallel with another high chain of mountains south of the route, and called "The Sirke," which forms a most important geographical feature in this region, some of the highest peaks reaching from 3000 to 4000 feet above the general level. A north-west direction was next pursued, until they reached the mass of mountains containing the sources of the Uliassutai and Buyantu tributaries of the Jabkan. This block was crossed by a snow-covered pass about 8000 feet, and then by a gradual descent for about two days into the valley of the Uliassutai, near its junction with the before-mentioned tributary. Twenty miles further up, the town of Uliassutai was reached on November the 2nd.

On their arrival they found the settlement in a state of great alarm, owing to the rumoured vicinity of a large body of Mahomedan rebels. A force of 1000 cavalry had been sent out to intercept them, but without success, and without obtaining sufficient knowledge of their movements to prevent a subsequent attack upon Kobdo. This circumstance proved fatal to the traveller's prospects of reaching Kuldja (Ili), according to his original plan, for the Mongol population had deserted the settlement, and thus no guides or animals were attainable.

The presence of three Russian traders with their servants, however, rendered the stay less monotonous; whilst the attentions of the civil governor of the town, named Tchekan, and formerly attached to the "Burlingame Mission" to Europe in 1868, was all that could be desired, and when the intended route southward had finally to be abandoned, he provided the party with an extra Mongol passport and a guide for Kobdo; but this guide, like the previous one, proved utterly worthless, and had to be abandoned half-way,

thus leaving the party a second time to its own resources. Though the altitude of Uliassutai is not more than 5700 feet, the climate is admitted to be very severe. During the eight days' stay, the thermometer seldom rose to 20° Fahr., even in the middle of the day.

Uliassutai is situated in a deep valley, having a narrow opening or gorge at its eastern end, through which flows the Uliassutai River; and the winds that almost daily whistle through this river-valley render it little better than a desert; cabbages and turnips being the only cultivation attempted. The business quarter of the town lies on the opposite bank of the river to the official portion, and its miserable, half-burnt appearance bore marked evidence to the rebel raid of 1870. The trade has consequently greatly fallen off: the only exports now being live-stock and skins, and the imports, flour and millet, clothing materials, cutlery and opium; everything being excessively dear. The population may be estimated at about 4000, the majority of which are said to be Mongols.

No fresh camels could be procured here, and the four she-camels had become mere skeletons; it became, therefore, necessary to reach Kobdo without delay. Retracing their steps to the Jabkan, they followed down the valley of that river for eight days; then crossing the river where it is intersected by the official track, made for Kobdo, by way of the southern shores of the Turgen and Aral Lakes. Indistinct rumours reached them from time to time of the presence of the rebels, partly confirmed by meeting with families of Mongols, with their flocks, herds, and tents, flying from the south-west towards the hills to the north. The range of sand-hills skirting the eastern shore of the Turgen Lake, and a similar one running from the sources of the Uliassutai and down the left bank of the Jabkan to the crossing, form peculiar features in the country, being sometimes nearly 200 feet in height, and composed entirely of loose sand. When subjected to the influence of a severe gale, their whole aspect is liable to remarkable changes; whilst an inconsiderable breeze is sufficient to obliterate the tracks of a large caravan of camels almost immediately after it has passed, extinguishing all traces of the line generally traversed, and rendering it dangerous and disastrous for the next comers.

From the south-west shores of the Turgen Lake a bold chain of mountains runs N.N.W. to the southern extremity of Lake Aral. There are two routes to Kobdo; one by way of the eastern slopes of the range, the other by the western. Here reports reached them of the burning of Kobdo by the rebels only three days previously, and that they were then marching in full force on Uliassutai by way of the western slope of the mountains. The latter

rumour fortunately proved unfounded. Lake Aral was crossed on the ice; there were no evidences of salt on its banks; and, from its general characteristics, the author believed the water to be sweet.

On the 28th of November, after a long day's journey N.N.W., the party reached Kobdo. The town is situated in a large stony plain, entirely bare of vegetation. It is said to have been at one time covered with timber, which has long since been exhausted. It consists of an official city or fortress, surrounded by a mud wall and moat, and of an open trading quarter to the south-east; and beyond this, in peaceful times, a large Mongol settlement. Unmistakeable evidences were now seen of the truth of the reports heard upon the road concerning the destruction and slaughter that had occurred but a few days previously, the bodies of the Mongols slain lying unburied, according to custom. The officials were naturally suspicious of the approach of the author's party, and it was only after employing an old Mongol woman as ambassadress, that food and fodder could be procured, and then only on condition of camping inside the settlement. The secretary to the Amban or governor was, however, very civil, and promised to procure them such necessaries as they might require, and camels and guides to take them to the frontier; which latter object he appeared particularly desirous of effecting with as little delay as possible, notwithstanding Mr. Elias' wish to remain a short time for purposes of observation. The place presented a most desolate appearance, all the inhabitants not killed having fled into the hills for safety, the soldiery shut up in the fortress alone excepted. Most of the shops and houses had been burnt, and all plundered. The author obtained a most interesting account of the affair from two Russian traders, left in the fortress by a caravan party which had departed just previously, and who were eye-witnesses of the scene. The trade of Kobdo is said to be greater than that of Uliassutai, with a population of 6000, of which 3000 are Mongols, and about 1650 soldiers. The only agriculture consisted of cabbages, turnips, and opium.

After a three days' stay, they received a notification from the officials that all was in readiness for their departure, and, being dependent upon the Governor for supplies, there was no alternative but to go. The march lay W.N.W. across the lower ranges of the Altai towards Suok, a Chinese border town, crossing a pass about 9000 feet to the valley of the Kobdo, near its upper course. The Russians have no official post or settlement at or near Suok, or indeed within several days' journey of it, the nearest being Ukek, 60 miles to the west, across high and difficult passes of the Altais; but encampments of Russian Kirghizes are usually found near

Suok. They are, however, a source of great trouble to both Russian and Chinese authorities, and are sheep-stealers and camel-lifters by profession.

The Altais were now crossed by a high but not difficult pass, and four days after leaving Suok they reached a temporary Russian settlement on the Chui. The chain of the Altais forms not only an excellent natural boundary between China and Russia, but serves as a line of demarcation between the Kalmucks on the north and the Mongols on the south. On arriving at the Chui, they fell in with the party of Russian traders who had fled from Kobdo the night before its destruction, and in their company proceeded to Bisk, the terminus of the post-road in this direction, arriving there January 4th, 1873.

Appended to Mr. Elias' paper is a *résumé* of former explorations in this region, and, what is of greater importance, a valuable series of observations and itineraries, taken and collected by himself during the journey. The observations, after having been computed, will be published with the paper in full in the 43rd volume of the Society's 'Journal.'

Mr. MITCHELL GRANT begged to state that Mr. Elias was not the first Englishman who had crossed Mongolia. Ten years ago he (Mr. Grant) had the honour of reading to the Society a paper describing his journey from Pekin to St. Petersburg across the Desert of Gobi. Since then he had crossed Mongolia eight times. But Mr. Elias was, no doubt, the first Englishman who had crossed Mongolia from Kalgan to Uliassutai. The word "Karakoram" was not a Mongolian word, and the Mongols did not know a place of that name. The Mongol word for the mountains was Khorin-daban. Karakoram was, probably, a misnomer for Khara-khorin—"kara" signified "black," and "khorin" means "twenty." When this place was built it was called "oorgoh," or "oordoh," meaning a "palace"—"oor" signifies "mortar," and "oodur" a "door." "Booluk" was an affix signifying "a spring or source of a river." "Balik" signifies "wisdom" in Mongol, and "bilik" was the Tartar word for "town." He preferred the former signification, namely, that the town should be called "Oordoh-Booluk." Mongolian travellers, desirous of finding the site of Karakoram, should inquire for Orkhon-booluk, which signified the source of the Orkhon, or otherwise the Khorindabin, which was the name of the Karakoram Mountains. D'Anville and Colonel Yule have given a supposed position of Karakoram on the Map of Asia. How could they do so unless they had some knowledge of the sources of the Orkhon? Ogati only lived at Karakoram for one month in the spring. The rest of the season was passed at Kertchagen, one day's journey from that town. It was built by the Persians, who wished to vie with the Chinese in their construction of Karakoram. The plain of Bargu of Marco Polo was forty days north of Karakoram. It is the oldest town in Siberia, and is now called Barguzin. According to Marco Polo, "You then travel on horseback, over mountains and through swamps, till you come to the very wild race who live by their cattle, the most of which are stags; and these stags, I assure you, they ride upon." During last year he (Mr. Grant) spent a month in that neighbourhood, travelling on horseback, and in other ways, over mountains and through swamps, and reached the country of the Tunguses, who ride, drive, and live upon the reindeer. The country was still as full of birds as ever, particularly the grouse and the partridge. The lakes were covered with

two kinds of wild duck, and the fish were so plentiful that the bears got fat upon them, and then they (the bears) were harmless, and the sportsman had an easy shot. The Russian Government derived a revenue from the receipt of gold in this neighbourhood and other parts of Oriental Siberia of three and a quarter millions sterling per annum, the profits on which were sufficient to pay for the whole of the expeditions which they have sent to Samarkand, Khiva, or any part of Central Asia.

The PRESIDENT drew attention to the fact that Mr. Elias' paper gave a very inadequate idea of the value of his journey. He had only been able to give a mere outline. The distance travelled was over 2000 miles, and during the whole of the period occupied in it he was observing astronomically, most steadily and accurately. He had brought over a series of observations for latitude and longitude, which were now being computed at Greenwich by Mr. Ellis, of the Royal Observatory, and they were found to be most valuable, and would enable us, for the first time, to lay down the geography of Central Asia on a mathematical basis. It was for this service that the Council had determined to confer upon him the Society's gold medal for the year. Although at these evening meetings the Society did not occupy itself much with these strictly technical points, yet, after all, it must be remembered that the accurate delineation of the physical features of the globe was the real foundation of geographical science, in which this Society was so much interested. A great deal had been said about Karakoram; and doubtless most of the present company had never heard of the word, for it was not a familiar one. But it so happened that, at the commencement of the thirteenth century, it was a very flourishing and populous place. It was never, indeed, a city, but a great encampment; for the Mogul Emperor and all his court lived in tents. At that remote period a large European colony was established in this central encampment of the Tartars. There was a jeweller from Paris who seemed to have been a most wonderful artist, for he made a stupendous piece of goldsmith's work for the king, and there were also a Parisian modiste, Hungarians, Germans, Armenians, and Greeks. The encampment lasted but a short time. "Karakoram" really meant "the black mountain," and it was good Turkish at the present day; and the same name was applied to a chain of mountains in Thibet near Yarkand, which Mr. Shaw had discovered the means of avoiding. This place (Karakoram) was the capital of the early Mongols for about a hundred years; but at the expiration of that time it became deserted, and probably at the present day there were no traces of it. With regard to the wild ass, he might say that it was common throughout all Asia, from the confines of China to the mountains of Syria, in Thibet, Yarkand, Bokhara, and Persia. In every desert through the whole of that extent our old friends of the Zoological Gardens might be discovered looking as well as possible. There was one other point mentioned in the paper, with reference to the Aral lake being fresh. Mr. Elias thought it must be so because two fresh rivers flowed into it. That was the very reason why it should be salt, because every fresh river brought down salt, which was left in deposit while the fresh water was carried off by evaporation; and it would be very curious indeed if this lake was fresh. He believed Mr. Atkinson had reported upon it. It was quite possible that in very severe weather it might have been frozen over. However, the question of salt and fresh lakes was well known to be an obscure and difficult one in physical geography. But no one could doubt that there must be outlets. The President concluded by pointing out on the map the part of the country to which Mr. Forsyth was now going on a mission from the Governor-General of India. He would be accompanied by some of those excellent native explorers who had been educated with so much benefit to the public service by Major Montgomerie, and he hoped that, through their means, we should obtain some accurate knowledge of the geography of the country, so as to be able to join together the different surveys which had been made.

ADDITIONAL NOTICES.

(Printed by order of Council.)

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ndum on the Route from Shahrúd, viâ *Kothal Vijmanun, to and Bandar-i-Gez, in Persia.* By Quartermaster-Sergeant R.E., attached to the Mission under Major-General Sir MID; with Notes by Sir F. GOLDSMID.

(Dated 7th February, 1873.)

cross the small section of country, as mapped by Khanikoff, ne extent from that here recorded, where the three stages between d Astrabad are equidistant, and where Bandar-i-Gez is placed the latter place. The Russian traveller makes Kuzluk much rabad than to Tásh, or than Tásh to Sharhúd; while Gez would ith than north of Astrabad. In the written description there is discrepancy. Khanikoff says that three chains of mountains horasan plains from the maritime coast, and these three must be hatever route the traveller takes to reach Shahrúd or Damghan . The first of the three passes, which he designates that of 'Ali- imates at about 6525 feet in height; the second, or 'Jilin-Bilin,' ; and the third, or 'Vijmanu,' at 9250 feet. Reversing the ed by Khanikoff, who was moving in the opposite direction to wer, the names of these places will be found to correspond very .]

Shahrúd to Tásh, 25 miles.

north-east, through the orchards and fields of Shahrúd, parallel of barren hills which terminate abruptly at about a mile out, I course to N.N.W. over a stony plain for 3 miles to the village of ll but prosperous-looking place near the road.* For 13 miles he road ran west, obliquely up the slope of the Kuhi Shahwar, nt was scarcely perceptible until the fourteenth mile, where I . From this point up to Tásh the path led up a narrow and , which in some parts was steep, and down which a torrent was great violence. About two miles from the village a more direct to Gez, but it is generally impassable at this season of the year. small place in the government of Astrabad, situated near the Kuhi Shahwar, with a present population of thirty families, but hole of these migrate to the plains of Astrábad in the winter. ties of grain are cultivated on the slopes of the mountains. The rance of the place presented a pleasing contrast to the villages of e houses being in terraces, well built, and remarkably clean.

Tásh to Kúzlúk, 25 miles.

spur of the Kuhi Shahwar, I descended some 500 feet, and N.N.W. direction up a ravine for 4 miles I reached the summit of

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F, coming from the sea to Shahrùd, or just the contrary way to that ower, thus writes in 1858: "Un peu au delá de ce village," alluding he southern side, "le défilé s'élargit, et débouche dans une vaste tend à perte de vue vers le Sud."—*Mémoire sur la Partie Méridionale trale.* Paris, 1861.

the Kothal-i-Vijmanun,* a short, but difficult pass connecting the Shahwar on the east with the lofty Shahkuh to the west. The descent was to a picturesque and fertile valley called Satruhvar, along which I travelled west for 8 miles, when, changing suddenly to N.W., I scaled a long and somewhat difficult pass called the Kothal-i-Jiling† to the tableland of Sar-i-Aliabad. This was green with rich pasturage watered by many springs and mountain-rills; but though there were a few shepherds encamped on the plain grazing their flocks, I could see no permanent habitations. At 18 miles from Tásh there was a small caravanserai, named Rabat Sajid, but so dilapidated and filthy as to be unfit for habitation. Two miles beyond this place the crest of Sar-i-Aliabad‡ was reached, and a magnificent view obtained over the forest-clad mountains to the plain of Astrabad. Five more, in which a descent of at least 4000 feet was made, by a winding and precipitous road, through the most charming scenery, brought me to the caravanserai of Kuzluk.§ It was so ruined and dirty, however, that I bivouacked under the trees.

Kúzúlk to Astrabad, 25 miles.

The way for the first 5 miles was N.W. by N. down the steep slope of the mountains on which I had slept, by a devious but smooth path through a dismal forest of varied and majestic trees. At its foot the road entered a glen at the junction of two streams, and proceeding down the glen in a general N.N.W. direction, by the bank of the ever-increasing torrent, emerged upon the open country at the eighteenth mile. Here the road became much cut up by water-courses led from the main stream for the irrigation of cultivation in the depths of the forest. The scenery at this point was particularly fine, and the vegetation luxurious; the mulberry, pomegranate, vine, and fig growing spontaneously, while the crops under cultivation appeared to promise a rich harvest. Seven miles more, W.N.W., through patches of alternate jungle and cleared land, brought me to Astrabad, a straggling town, protected by a high mud wall and dry ditch, with a garrison of 2000 men. Its trade is said to be on the increase, but that and its general prosperity is greatly retarded by the raids of the Turcomans.‖ So daring are they that people have been carried off from the very gates of the town, and the agriculturists, dispersed as they are throughout the forest in small parties, live in imminent danger of capture.¶

Astrabad to Bandar-i-Gez, 33 miles, W.N.W.

The march for the first 15 miles was through an inhabited country, well cleared and cultivated, and in some parts strikingly pretty. The villages

* Khanikoff surmounted this pass at a height of 2815 mètres; after which he mentions entering suddenly an utterly woodless tract, and making a rapid descent into the dry plains of Khorasan.

† Called by Khanikoff "Djilin-Bilin" and estimated by him at 2281 mètres.

‡ Estimated by Khanikoff at 2007 mètres.

§ Kuzluk was M. Khanikoff's first stage from Astrabad. He says he slept there among ruins, the village itself being remarkable for the number of leopards found in the caves of the deep wooded ravines north of the cultivation.

‖ For this same reason, M. Gmelin, 100 years ago (September 1771), could not reach Astrabad from Sari.—*Suite du Voyage en Perse*. Berne, 1781.

¶ M. Khanikoff says of Astrabad, 1858: "Le 15 Avril, pendant notre séjour, les nomades attaquèrent une caravane aux portes mêmes de la ville, tuèrent 15 individus, en emmenèrent beaucoup d'autres en captivité et pillèrent le Bazár." Mr. Eastwick writes three years later: "Around the city goes on a continual struggle between the nomad tribes of the Turkomans and the more civilised settled Persian race. Not a day passes that some deed of blood is not done, or some plundering foray or retributive expedition undertaken." Also: "The Turkomans could, at any time, take Astrabad with the greatest ease. A place was pointed out to me where some of them, *a short time before*, had entered," &c.

were all at some distance from the road, and it was only occasionally that glimpses of them, cropping out above the exuberant vegetation, could be obtained. For 18 miles, to the Caspian at Bandar-i-Gez, the road ran through an uninterrupted forest. At this season the road was dry and good, but the once magnificent causeway of Shah Abbas has almost disappeared, and it was only at long intervals that I saw uptorn portions of it.* Gez is a thriving town, scattered over a large area, about 3 miles to the south of its port, within the forest.†

The port of Gez, or "Kinar-i-Bandar-i-Gez," as it is written, consists of an incomplete caravanserai, custom and warehouse, and a few wretched huts occupied by shipping officials and traders. Many offers have been made by Russia to build a pier here, as the water is too shallow to admit of even cargo-boats coming within 200 yards of the beach; but all such have been jealously declined by the Persian Government, nor will it permit the present rude and dangerous structure to be replaced or improved by the merchants interested.

I was also informed that Russia had been desirous of establishing a naval sanitorium here, but that privilege appears to have been declined also, and they have no footing whatever upon the mainland of Persia in this quarter, beyond an acre or so of land near the shore for the growth of vegetables.

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2. *Miscellaneous Notes on Eastern Turkistan.* By R. B. Shaw.

I. Measures (linear) used in Eastern Turkistan:

2 cheeza = 1 alcheen = 28 inches English (comp. Russian arschine.)

II. Exchange of Yarkand Currency with Indian.

Taking gold as the standard:—

1 tillah = 6 rupees = 34 tangas.
1 rupee = 5·7 tangas (= 2 shillings).

Taking silver as the standard:—

1 koors = 166 rupees = 1080 tangas (average).
1 rupee = 6·5 tangas.

Roughly speaking, 1 rupee may be taken to equal 6 tangas, or 1 shilling to equal 3 tangas.

III. Relative Value of Silver and Gold in East Turkistan.

On an average—

4 sêr of gold = (12¾ rupees weight) are given for one koors of silver (= 160 rupees' weight).

∴ Value of silver is to that of gold as 1 to 12½ (about).

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* M. Khanikoff says of this part of the road: "Nous mîmes deux jours à traverser la plaine boisée qui s'étend entre Astrabad et la plage. La Chaussée de Chah Abbas que nous suivions semble n'avoir été jamais reparée depuis la mort de ce grand roi; elle était dans un état déplorable." . . . . "La beauté de la forêt était telle, qu'en admirant ses arbres gigantesques, on oubliait le mauvais état de la route. . . . . Les vignes sauvages . . . . étalaient d'un arbre à l'autre leurs festons verdoyants sous lesquels le jasmin, le grenadier, les pruniers, et surtout le crataegus, formaient des bosquets souvent impénétrables."

† The exact spot where Mr. Jonas Hanway landed in December, 1743, may not easily be determined, but it is stated that, "having satisfied the people they were friends, he was received by them on the shore, and conducted by many crooked paths through a thick wood, to a small village; the city was about eight hours distant."

IV. Weights in use at Yarkand and Kashgar :—

10	foong	= 1 miscâl.
10	miscâl	= 1 sêr (= 3¼ rupees-weight, nearly).
16	sêr	= 1 jing (= 1¼ lb. avoirdupois).
4	jings	= 1 châràk (of raw silk).
12½	jings	= 1 old châràk.
16	jings	= 1 new, or Andijânee châràk (and for all other goods).

V. Coins circulating in Eastern Turkistan.

2 phools (imaginary coins)	= 1 dahcheen (small copper coin).
50 phools or 25 dahcheen	= 1 tanga (imaginary coin).
34 tangas (about)	= 1 tillah (a gold coin).
From 1070 to 1100 tangas	= 1 koors or yamboo (a large Chinese silver boat-shaped lump, worth 166*rs.*, = 16*l.* 12*s.*
From 32 to 34 tillahs	= 1 koors.

N.B.—The number of tangas given for a tillah, or for a koors, and the value of the latter in tillahs, are subject to daily variation in the markets of Yarkand and Kashgar according to the relative supply of copper, silver, and gold. The tanga of Khoten is worth two Yarkand tangas.

VI. Taxation of Eastern Turkistan.

The taxes are of three kinds :—

1. Kharâj. This is a tax of one-tenth of the gross produce of the land, levied in kind by officers entitled "Sirkar."

2. Zâkât is a tax of one in forty, levied yearly on the increase of all sheep, cattle, and live-stock-generally ; also a custom duty of the same amount on all imported goods ("Kafirs," or non-Mussulmans, have to pay double).

3. Tanâb is a tax on orchards, pleasure-grounds, &c. The unit of measurement is a "gaz" of seven times the breadth of the four fingers plus the length of the thumb. Land of the description thus taxed, measuring forty such "gaz" all round, pays 12 tangas a year = 4*s.* (This "gaz" would be about 3 feet 6 inches.)

All local expenditure is defrayed from the district taxes, the balance of which is sent to the immediate superior, who does the same in his turn. The proper expenditure of each of these officers is allowed him in account; he has no specified salary, and his promotion depends on the balance which he can transmit annually from his district.

VII. Comparative Prices of English Piece Goods :—

Description.	In Bombay.		In Yarkand.	
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Prints (per piece of 28 yards)	3 11	to 13 0	16 0	to 44 0
Shirtings (white) (per piece of 40 yds.)	10 1	„ 20 2¾	28 0	„ 40 0
Muslin for turbans „ 20 „	2 0	„ 4 0	16 0	
Printed muslins „ 12 „	3 2	„ 4 0	12 0	
Figure shirtings „ 40 „	13 0	„ 14 0	40 0	
Women's veils (red)	2 6	„ 3 9	8 0	
Green tea (per lb.)	.. ..	.. ..	4 6	„ 10 0

N.B.—These Yarkand prices were obtained from a native merchant from [redacted] India, who was in Yarkand at the time with a venture.

The Bombay prices are taken from the trade-circular of Messrs. Nicol & [redacted] Co., of Bombay, for September, 1869.

Numerous samples of the Russian piece goods, with which the Yarkand and [redacted] Kashgar markets are filled, are to be seen at the India Office ; Dr. Forbes [redacted] Watson having kindly had them mounted on card-board, with prices, &c., [redacted], plainly marked. English goods are almost unknown in Eastern Turkistan[redacted].

The above prices are those obtained from some taken up as a venture by the Sikh merchant Tara Sing.

The cost of carriage from Bombay to Yarkand is about 3*l.* 15*s.* per cwt. It is calculated that the Russian goods which now have possession of that market cost 4*l.* 10*s.* per cwt. in carriage from Moscow to Yarkand.

VIII. Letter from Mohamad Yakoob Ataligh Ghazee, King of Eastern Turkistan.

To the receptacle of honour and dignity, Robert Berkeley Shaw, *Sahib.*

After performance of the ceremonies of friendship, let it be revealed to the intelligent and sublime understanding of the wise and sagacious and eloquent [gentlemen] of high rank and dignity that I received the letter and presents you sent from Yarkand, together with the double-barrelled gun, by the hand of Azim-baï, and was glad to learn that you were enjoying good health. Letters serve as half meetings. It is my constant prayer that you may be preserved in good health. All goes right here. I have sent you a keepsake, and the peace be with you.

(Seal of) Mohamad Yakoob,
1286 (A.H.).

[Translated in the Office of the Secretary to the Government, Punjab.]

IX.—Chronological Cycle of Twelve Years used in Turkistan.

No.	Names of the years.	Meaning.	Supposed peculiarities.
1	Chichkan	Mouse	Fine crops and happiness.
2	Kila	Cow	Many deaths and much affliction.
3	*Koblán*	Leopard or ounce	Enmity between kings.
4	Toshkan	Hare	Bad weather, hurricanes.
5	Boolook	Alligator	Much water from the mountains.
6	Eelân	Serpent	Plagues of snakes and scorpions.
7	At	Horse	Male children born this year.
8	Koee	Sheep	Everything plentiful.
9	Maimoon	Monkey	Much deceit among men.
10	Tookha	Fowl	Trees produce much fruit.
11	Eet	Dog	Female children born this year.
12	Tangoos	Pig	Faithlessness and treachery.

This cycle of years is still chiefly used in Turkistân, being a relic of their old religion. Compare this with a similar but more complex cycle among the Thibetans.

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3. *Meteorological Observations taken at Lé.* By W. H. Johnson; with Remarks by Major T. G. Montgomerie, R.E.

The following observations were taken by W. H. Johnson, Esq., F.R.G.S., Governor of Ladak for H.H. the Maharajah of Kashmir, Jummoo, &c., at Lé the capital of Ladak, 11,500 feet above the sea.

Mr. Johnson remarks that January is the coldest month at Lé, and, on looking at the column of remarks, it will be seen that the weather was very much more stormy and rough than was to have been expected in a province of Thibet, where clouds are generally supposed to be very rare. Mr. Johnson says that on some of the clear days, when it was windy and the thermometer below zero, the cold was intense, so much so, that when he went out of the house his feet used to feel as if they had had hot irons applied to them, though he wore thick felt stockings. His letter was dated Lé, 7th February, 1873, and he says that the cold was then not so severe, as the days were getting longer.

I had heard occasionally from Mr. Johnson all through the winter, so there is no doubt that communication can be kept up between Ladak and Thibet during the winter, though the great Himalayan ridge intervenes. This communication is no doubt irregular, inasmuch as the messengers have to wait for a break of fine weather; but, as I understand, there is but one pass that can be crossed during the winter, viz. the Zojji-La, between Dras and Kashmir, which, even in fine weather, involves travelling through upwards of 20 miles of snow, as we are aware from the very late time of the year that Mr. Johnson himself crossed on his return from Khotan, when he and his men all suffered severely from frost-bite and exposure. The danger of the crossing in winter is, no doubt, much reduced by the huts which the Maharajah has had built at intervals on both sides of the pass, otherwise even the Zojji-La pass would prove fatal much oftener than it does. A description of the general aspect of this pass is given by Le Père Desideri in the 'Lettres Edifiantes,' and he certainly does not make it out to have been better formerly than it is now. During summer it is, however, an easy pass to cross; the change from the luxuriant vegetation of a Kashmir side-valley to the desolation of Thibet is apt to strike those who see it for the first time.

Apparently the river Indus was frozen on the 8th of January, which indicates a very low temperature, as the stream near Lé is very rapid, and the body of water is large. During the whole month of January there were only seven clear days, almost all the other days there was snow either at Lé itself or in the mountains around. The actual fall of snow is not, however, I understand, very great, and I believe does not generally remain long on the ground.

"*Postscript.*—Since writing about the meteorological observations taken by Mr. Johnson in Ladak during last winter I have heard from him again. He seems to have had a very severe winter for Thibet, and I enclose a memorandum embodying his further remarks, which, I think, may prove of interest, coming from such an elevated and little-known part of the world. If convenient, the enclosed might be published in continuation of the memorandum which I sent before.

"T. G. Montgomerie.

"Mr. Johnson, writing on the 5th of March, says that his messengers inform him that at Rudok and Gartok there was a fight going on between the authorities of the country and the people that live a wandering life (the Khambas); the latter have of late been plundering the peaceful dwellers in fixed camps, and there is altogether a great deal of turmoil in this westerly part of Thibet. Troops are, however, said to be coming from Lhasa.

"Mr. Johnson goes on to say that they have had snow nearly every day up to 5th March, but that he had managed to go down to Khulsee by marching over the frozen bed of the Indus River, which he found a solid mass of ice from Pituk Monastery below Lé to Dah. Above Pituk the river was only partly frozen over, owing to the great number of hot springs which flow into it above Upshi. These hot springs are very numerous in the upper part of the Indus, some rising in the stream itself, their position being apparent from the steam which rises from their neighbourhood.

"Mr. Johnson went to Khulsee to see to the repairs of the well-known bridge which spans the Indus there, where it is very narrow. This bridge is the only permanent one over the Indus below Lé. The snow in Khulsee had fallen to the depth of 12 inches, but in Lé it never exceeded 4 inches at a time.

"Writing on the 16th February, he said they had had another fall of snow, the Dras (Zojji-La) Pass was closed, and some more men had been lost by avalanches falling on them. The closing of the pass must have lasted for a long time, as Mr. Johnson's letters of the 16th February and 5th March reached me by the same post."

Thermometric Observations taken by W. H. Johnson, Esq., at Lé during January, 1873.

Day of Month.	Hour of Observation.	Thermometer in open Air on House.	Thermometer in open Court-yard.	Thermometer in Room without Fire.	Second Thermometer.	Remarks.
1872						
Dec. 31	6	31	32	37	36	Snowing.
,,	8	31	32	37	36	Ditto.
,,	9	34	32	37	36	Ditto.
1873						
Jan. 1	12	34	36	36	36	Very cloudy.
,,	3	30	35	32	34	Ditto.
,,	4	30	33	32	33	Ditto.
,,	6	29	33	33	31	Ditto.
,,	9	25	31	32	27	Cloudy.
,,	12	21	29	31	24	Ditto.
,,	3	19	26	28	27	Ditto.
,,	6	23	28	29	32	Ditto.
,,	9	32	34	33	39	Ditto.
Jan. 2	12	37	38	34	40	Snowing on hills.
,,	3	37	38	34	40	Ditto.
,,	6	33	37	33	39	Ditto.
,,	9	33	35	34	37	Ditto.
,,	12	33	33	33	36	Ditto.
,,	3	27	33	33	36	Snowing.
,,	6	28	32	32	35	Ditto.
,,	9	31	33	32	36	Ditto.
Jan. 3	12	37	39	34	38	Ditto.
,,	3	36	38	35	37	Clear.
,,	6	34	35	33	36	Ditto.
,,	9	25	30	31	32	Ditto.
,,	12	22	28	30	29	Ditto.
,,	3	20	26	28	29	Ditto.
,,	6	23	28	27	29	Ditto.
,,	9	28	32	27	33	Cloudy.
Jan. 4	12	37	39	29	40	Snowing on hills.
,,	3	36	38	29	40	Ditto.
,,	6	35	37	30	38	Snowing.
,,	9	35	36	30	37	Ditto.
,,	12	26	32	30	34	Ditto.
,,	3	25	30	30	32	Ditto.
,,	6	20	25	27	27	Ditto.
,,	9	25	30	27	31	Ditto.
Jan. 5	12	25	30	28	31	Ditto.
,,	3	25	30	28	31	Snowing on hills.
,,	6	26	31	28	33	Ditto.
,,	9	26	32	29	33	Ditto.
,,	12	25	30	29	32	Ditto.
,,	3	23	29	27	30	Ditto.
,,	6	19	25	26	27	Snowing.
,,	9	18	24	24	26	Ditto.
Jan. 6	12	24	29	29	31	Very cloudy.
,,	3	23	29	29	30	Snowing on hills.
,,	6	21	29	28	30	Ditto.
,,	9	20	26	27	27	Snowing.
,,	12	18	24	23	26	Ditto.

THERMOMETRIC OBSERVATIONS—*continued.*

Day of Month.	Hour of Observation.	Thermometer in open Air on House.	Thermometer in open Court-yard.	Thermometer in Room without Fire.	Second Thermometer.	REMARKS.
1873						
Jan. 6	3	16	22	22	23	Snowing.
,,	6	16	23	23	25	Ditto.
,,	9	25	30	26	28	Snowing on hills.
Jan. 7	12	25	30	26	28	Ditto.
,,	3	16	21	22	24	Ditto.
,,	6	16	20	21	22	Ditto.
,,	9	15	20	21	22	Snowing.
,,	12	14	18	17	21	Ditto.
,,	3	11	16	17	19	Ditto.
,,	6	10	16	16	18	Snowing on hills.
,,	9	10	16	17	18	Ditto.
Jan. 8	12	12	17	19	18	Clear.
,,	3	11	16	17	17	Ditto.
,,	6	10	17	17	17	Ditto.
,,	9	7	14	15	16	Snowing, Indus frozen.
,,	12	6	13	14	16	Ditto.
,,	3	5	12	14	14	Ditto.
,,	6	5	11	14	13	Ditto.
,,	9	9	13	14	13	Ditto.
Jan. 9	12	12	16	15	16	Snowing on hills.
,,	3	11	16	17	17	Clear.
,,	6	12	17	17	17	Snowing on hills.
,,	9	11	20	18	21	Snowing.
,,	12	11	21	20	21	Ditto.
,,	3	9	17	20	18	Ditto.
,,	6	10	17	18	18	Ditto.
,,	9	11	18	18	19	Ditto.
Jan. 10	12	11	18	17	19	Snowing on hills.
,,	3	10	17	17	18	Ditto.
,,	6	9	15	15	16	Ditto.
,,	9	9	15	16	16	Ditto.
,,	12	6	16	17	17	Clear.
,,	3	5	15	16	17	Ditto.
,,	6	5	14	15	16	Ditto.
,,	9	6	15	15	16	Ditto.
Jan. 11	12	9	16	15	16	Ditto.
,,	3	6	14	15	15	Ditto.
,,	6	6	14	14	15	Ditto.
,,	9	5	13	14	13	Ditto.
,,	12	5	9	10	10	Snowing.
,,	3	4	9	10	10	Ditto.
,,	6	4	9	11	11	Ditto.
,,	9	5	10	11	11	Ditto.
Jan. 12	12	7	11	11	10	Ditto.
,,	3	7	11	11	12	Ditto.
,,	6	6	10	11	12	Snowing on hills.
,,	9	6	10	11	11	Ditto.
,,	12	6	10	11	10	Ditto.
,,	3	5	9	11	11	Ditto.
,,	6	4	9	11	10	Ditto.
,,	9	2	6	9	8	Ditto.
Jan. 13	12	3	0	5	6	Clear.
,,	3	5	2	2	0	Ditto. Wind.

THERMOMETRIC OBSERVATIONS—*continued.*

Day of Month.	Hour of Observation.	Thermometer in open Air on House.	Thermometer in open Court-yard.	Thermometer in Room without Fire.	Second Thermometer.	REMARKS.
1873						
Jan. 13	6	−2	1	3	2	Cloudy. Wind.
,,	9	−2	1	3	1	Ditto. Ditto.
,,	12	−3	1	3	0	Very cloudy.
,,	3	3	4	5	5	Snowing.
,,	6	3	6	5	5	Ditto.
,,	9	5	6	5	7	Ditto.
Jan. 14	12	6	6	5	9	Ditto.
,,	3	6	7	5	10	Snowing on hills.
,,	6	5	9	7	10	Ditto.
,,	9	5	8	7	10	Ditto.
,,	12	4	7	7	10	Ditto.
,,	3	−3	0	4	7	Ditto. Windy.
,,	6	−4	−1	3	1	Ditto. Ditto.
,,	9	−5	−1	3	−1	Ditto. Ditto.
Jan. 15	12	−6	−1	3	−2	Ditto. Ditto.
,,	3	−9	−3	1	−3	Clear and windy.
,,	6	−8	−2	3	−3	Ditto.
,,	9	−8	−2	3	−4	Ditto.
,,	12	−8	−3	0	−3	Ditto.
,,	3	−10	−2	3	−7	Ditto.
,,	6	−10	−4	1	−8	Ditto.
,,	9	−8	−2	1	−6	Ditto.
Jan. 16	12	−6	−1	2	−2	Ditto.
,,	3	1	3	6	4	Cloudy.
,,	6	3	6	7	6	Snowing on hills.
,,	9	5	8	9	7	Ditto.
,,	12	6	9	9	8	Ditto.
,,	3	6	9	9	10	Ditto.
,,	6	7	9	10	10	Ditto.
,,	9	7	9	10	10	Ditto.
Jan. 17	12	8	9	10	10	Ditto.
,,	3	7	8	10	11	Ditto.
,,	6	7	10	11	11	Ditto.
,,	9	7	10	10	12	Ditto,
,,	12	7	11	11	11	Ditto.
,,	3	6	9	10	11	Snowing.
,,	6	7	10	11	12	Ditto.
,,	9	10	13	14	13	Ditto.
Jan. 18	12	11	15	15	14	Snowing on hills.
,,	3	10	12	12	14	Ditto.
,,	6	9	11	12	13	Ditto.
,,	9	9	11	12	14	Ditto.
,,	12	8	10	11	13	Snowing.
,,	3	5	8	10	10	Ditto.
,,	6	6	9	10	11	Ditto.
,,	9	8	10	12	13	Ditto.
Jan. 19	12	9	11	12	13	Ditto.
,,	3	9	11	13	13	Snowing on hills.
,,	6	6	8	12	11	Ditto.
,,	9	5	8	11	10	Ditto.
,,	12	4	7	9	9	Ditto.
,,	3	2	5	7	7	Ditto.
,,	6	3	5	7	7	Ditto.

THERMOMETRIC OBSERVATIONS—*continued.*

Day of Month.	Hour of Observation.	Thermometer in open Air on house.	Thermometer in open Court-yard.	Thermometer in Room without Fire.	Second Thermometer.	REMARKS.
1873						
Jan. 19	9	5	8	7	8	Snowing on hills.
Jan. 20	12	6	8	7	9	Clear.
,,	3	6	8	9	9	Ditto.
,,	6	5	7	8	9	Ditto.
,,	9	3	6	7	8	Dltto.
,,	12	1	3	4	4	Ditto.
,,	3	−5	−2	1	1	Ditto.
,,	6	−4	−1	1	1	Ditto.
,,	9	2	4	2	6	Cloudy.
Jan. 21	12	3	7	5	6	Ditto.
,,	3	4	6	7	6	Snowing on hills.
,,	6	5	8	7	7	Ditto.
,,	9	3	6	7	5	Ditto.
,,	12	2	5	6	5	Ditto.
,,	3	1	4	5	4	Snowing.
,,	6	4	7	6	7	Ditto.
,,	9	6	9	7	9	Ditto.
Jan. 22	12	7	8	7	9	Ditto.
,,	3	8	10	8	9	Snowing on hills.
,,	6	7	10	8	8	Ditto.
,,	9	4	7	8	8	Ditto.
,,	12	3	6	7	7	Ditto.
,,	3	2	4	6	6	Ditto.
,,	6	2	4	6	5	Very cloudy.
,,	9	4	7	6	6	Ditto.
Jan. 23	12	7	10	12	11	Clear.
,,	3	7	11	12	11	Ditto.
,,	6	7	11	12	11	Ditto.
,,	9	7	11	12	11	Ditto.
,,	12	6	11	12	11	Ditto.
,,	3	6	11	11	11	Ditto.
,,	6	7	12	12	12	Ditto.
,,	9	9	13	12	12	Ditto.
Jan. 24	12	9	13	14	14	Cloudy.
,,	3	9	13	14	14	Ditto.
,,	6	9	14	14	13	Ditto.
,,	9	7	12	13	13	Clear.
,,	12	7	12	13	13	Ditto.
,,	3	6	10	12	11	Ditto.
,,	6	8	11	13	11	Ditto.
,,	9	11	13	13	12	Cloudy.
Jan. 25	12	12	13	13	12	Very cloudy.
,,	3	12	14	14	15	Ditto.
,,	6	11	14	14	15	Snowing on hills.
,,	9	11	13	14	13	Ditto.
,,	12	10	12	13	13	Ditto.
,,	3	9	12	14	13	Snowing.
,,	6	10	12	14	13	Ditto.
,,	9	11	13	14	14	Ditto.
Jan. 26	12	14	17	16	18	Ditto.
,,	3	12	17	16	17	Snowing on hills.
,,	6	11	17	17	17	Ditto.
,,	9	11	17	18	18	Ditto.

THERMOMETRIC OBSERVATIONS—*continued.*

Day of Month.	Hour of Observation.	Thermometer in open Air on House.	Thermometer in open Court-yard.	Thermometer in Room without Fire.	Second Thermometer.	REMARKS.
1873						
Jan. 26	12	11	15	18	19	Snowing on hills.
,,	3	10	15	17	17	Cloudy.
,,	6	12	15	17	18	Ditto.
,,	9	13	16	17	18	Ditto.
Jan. 27	12	14	17	17	18	Ditto.
,,	3	14	17	17	18	Ditto.
,,	6	13	18	18	19	Snowing.
,,	9	12	17	18	18	Ditto.
,,	12	12	16	17	17	Ditto.
,,	3	11	15	17	17	Ditto.
,,	6	11	14	16	16	Ditto.
,,	9	11	14	16	14	Snowing on hills.
Jan. 28	12	15	16	16	17	Ditto.
,,	3	15	17	18	17	Ditto.
,,	6	15	18	18	17	Very cloudy.
,,	9	14	18	19	18	Ditto.
,,	12	13	17	19	18	Ditto.
,,	3	11	15	17	17	Snowing on hills.
,,	6	11	15	17	17	Ditto.
,,	9	12	16	18	17	Ditto.
Jan. 29	12	16	19	20	19	Cloudy.
,,	3	14	17	19	19	Ditto.
,,	6	12	16	18	17	Clear.
,,	9	10	14	18	16	Ditto.
,,	12	9	14	18	15	Ditto.
,,	3	8	13	18	14	Ditto.
,,	6	9	13	18	14	Ditto.
,,	9	12	16	18	16	Ditto.
Jan. 30	12	15	18	20	17	Cloudy.
,,	3	15	19	19	18	Very cloudy.
,,	6	14	18	19	18	Snowing on hills.
,,	9	13	17	18	17	Ditto.
,,	12	13	15	17	17	Ditto.
,,	3	11	14	16	17	Ditto.
,,	6	14	18	16	18	Ditto
,,	9	15	18	16	19	Ditto.
Jan. 31	12	16	19	19	20	Ditto.
,,	3	16	19	19	20	Ditto.
,,	6	16	20	21	20	Ditto.
,,	9	15	19	21	19	Ditto.
,,	12	15	19	21	19	Snowing.
,,	3	13	17	20	18	Ditto.
,,	6	16	19	20	19	Ditto.
,,	9	17	20	21	20	Ditto.
Feb. 1	12	18	20	21	21	Snowing on hills.

Thermometer in room with a good fire day and night, ranges from 42° to 36° generally at night, and 52° to 40° in the day; with doors and windows shut and curtained with double felt, also walls covered with felt. The room has two open windows.

W. H. JOHNSON.

4. *Limnimetric and Meteorological Observations in Switzerland.* By Professor PAUL CHAIX, Corresponding Member R.G.S.

I HAVE just sent to the Royal Geographical Society a map, under the title of General Table of the Limnimetric and Meteorological Stations in Switzerland during the Year 1871, collected by the Federal Hydrometrical Board. A careful examination of the results seems to me to point the way to a few general facts, which I beg leave to submit to your attention, with the addition of some other observations.

Those stations only have been inscribed on the Hydrographical Map of Switzerland where observations have led to important results. They are 94 in number, 39 of which belong to the mountainous regions. They seem to authorise a division into eight or nine groups, a division based *à priori*—1st, upon the geographical position; 2nd, upon the udometric results to which observations have led:—

1st. The Jurassic station, on a line from Geneva to Olten, where the average yearly fall of rain amounts to 943 millimètres for the plains, and 1313 in the mountains.

2nd. Stations on a meridian line, from Bex in the south to Friburgh in the north, all placed on a higher level than the plains of the above-mentioned group. Here the rains, brought by the western winds to a broken line of mountains of moderate height, are stopped before that curtain, and precipitated to the average amount of 1218 millimètres.

3rd. Fifteen stations scattered on the tableland of the centre of Switzerland, from Berne to Constance, where the average fall is 1000 millimètres.

4th. Twenty-five stations, central highland stations, from the Beatenberg on the south-west to Davos and St. Gall on the north-east. In that important region the average rainfall is indeed 1461 millimètres, but it is greatly surpassed on the top of the Rigi (1828 millimètres); at Linthal, at the south extremity of Glarus (2202 millimètres); and, above all, at Thusis, where the fall reaches 2755 millimètres.

5th. At the stations in Valais (not including mountain-passes) the average is reduced to 680 millimètres, and to 791 millimètres in the five stations of Engadine; which two valleys are, the one as well as the other, on a line from east by north-east to south-west by west, and equally sheltered from rainy winds from the west and from the north.

6th. On the western passes, the Great St. Bernard and the Simplon, the fall is 1030 millimètres.

7th. On the eastern passes, the Grimsel, St. Gothard, Lukmanier (La Platte), Splugen, St. Bernardin, the Julian, and the Bernina, the average is 1835 millimètres; but the amount of rain reaches 2328 at the Grimsel, and 2742 at St. Bernardin.

8th. Five stations scattered on the south side of the Alps, in the Tessin and Val Bregaglia, offer almost identically a rainfall of 1665 millimètres.

Hydrometric Measurements.—The Swiss rivers distribute their waters in four different basins or watersheds, the extent of which, on the Swiss territory, is given, together with the length of their course, in the following table:—

		Square Kilomètres.	Course in Kilomètres.
In the basin of the	Rhine	35,906·65	.. .. 319·5
„ „	Rhône	7,994·51	.. .. 233·4
„ „	Tessin	6,548·09*	.. .. 70·4
„ „	Inn	1,971·30	.. .. 87·2
		52,420·55	

* 2,700 of which are out of Switzerland.

discharge of the Rhône, at the Porte de Sex, before it enters the Lake neva, is 737 cubic mètres per second when at its maximum, 58 as a ium, and 199 upon an average. On the other extremity, where it flows the lake, it is given as 82 for a minimum, 270 as an average, and 418 highest. We cannot, however, fail to check the above numbers by others, the result of the experience of skilful observers and of our own; ibic millimètres is below the proper number, as it is below that of 424 by General Dufour, Professor Auguste de la Rive, and Professor Daniel on, who measured the discharge of the river on the 24th of September, when they were no longer at their highest level. On the other hand, sor Plantamour and myself measured them at their very lowest ebb on th of March, 1858, when the discharge was reduced to no more than bic mètres in a second, much less than the number 82 given by the metric Commission. A few days before that date, and much under me atmospheric circumstances, M. Charles Dufour, of Morges, did not ore than a discharge of 39 cubic mètres at the Porte de Sex.

curious but very plain fact of the maximum discharge being less at the end of the lake than it is where the Rhône enters it, is easily explained by ort duration of very high waters, sometimes not more than a few hours, e spreading of those waters over the vast surface of the lake; while at d of winter and the first weeks of the spring the lowest level is sometimes me for weeks together.

second proof of the happy regulating influence of our lakes on their ary streams is found again in this fact—that the Rhine, measured at Au, Rheinthal, has a minimum discharge of 83 cubic mètres, an average of nd a maximum of 902 in a second; while at its outlet from the Lake stance, at Stein, the minimum being 124 cubic mètres, the average 330, aximum does not rise above 594.

same river, as it flows out of our territory below Basle, discharges 2997 mètres per second at its maximum, 899 at their lowest ebb, and 1000 average. Partial measures have been made of the three streams, the the Limmat, and the Upper Aar, before they meet, as well as their waters in the Aar at Döttingen, at a short distance below their meet- int. The numbers thus obtained offer a striking concordance as far as west and average waters are concerned, while the united streams do t high waters, reach the amount of the three different high-waters r:—

	Limmat.	Reuss.	Aar.	Sums.	The Aar, measured at Döttingen, below the Junction at Brugg.
a ..	342	466	1028	1836	1616
ge ..	84	133	291	508	512
a ..	38	46	124	208	209

This is a natural result, as there is but little likelihood that the period of the highest waters should happen at the very same time in the three streams. By the same cause the discharge of the river Zihl, flowing from the Lake of Bienne, added to that of the Aar at Aarberg, makes a sum a little greater than the result of a direct measurement made below the point where they meet:—

	Maximum.	Average.	Minimum.
The Zihl discharges	191	62	28 m.
The Aar at Aarberg	673	231	95 „
Sums	864	293	123 „

	Maximum.	Average.	Minimum.
Discharge of the Rhine at Büren	869	231	95 cubic mètres.

The total discharge of all the united waters at their average level is, for—

The Rhine	1000 cubic mètres
„ Rhône	270 „
„ Tessin	401 „
„ Inn	37 „
All the collected waters of Switzerland	1708 „

distributed over a total extent of 524 square myriamètres, give, as a mean discharge for each square myriamètre, 3 m. 2 cubic mètres of water, or for each separate basin:—

The Rhine	2·8 cubic mètres per second
„ Rhône	3·4 „ „
„ Tessin	6·0 „ „
„ Inn	3·0 „ „

The variations in the level of the lakes are as follow between their highest and lowest level:—

	Extent		Discharge per Second, in Cubic Mètres			Variation of Level.
	In Hectares.	In Swiss Square Leagues.	At Lowest Level.	At Average Level.	At Highest Level.	
						Mètres.
Lago Maggiore	21,427	9·30	126	401	848	7·50
Lake of Constance ..	53,913	23·40	124	330	594	3·00
,, Lugano	5,046	2·19	11·7	30	181	2·46
,, Lucerne	11,335	4·92	32	95	311	2·50
,, Brienz	2,995	1·30	20	57	197	2·5
,, Zurich	8,778	3·81	24	61	226	2·2
,, Bienne	4,216	1·83	28	62	191	2·0
,, Geneva	57,784	25·08	82	270	418	1·7
,, Neuchâtel ..	23,961	10·40	23	52	182	1·7
,, Movat	2,741	1·19	8	17	77	1·6
,, Thun	4,792	2·08	38	99	356	1·0
,, Zug	3,848	1·67	3	8	34	0·6

Doubts may still rest, not, indeed, on the accuracy of the above-named observations, but on the possibility of drawing definite conclusions regarding Swiss meteorology from observations spread over so limited a period. The

Hydrometric Commission has not as yet been at work more than six years, and the result of their measures has not always been found in complete conformity with other positive observations, such, for instance, as mine on the Rhône. Besides, Professor E. Plantamour, himself a member of the Commission, asserts that it is very difficult completely to rely on the data of the rain-gauge in very high stations, where most of the rain falls in the shape of snow and with stormy weather.

Professor M. Alphonse Favre has already undertaken the very serious labour of sounding the Lake of Geneva at the lower extremity of its basin, where he found by two lines of soundings opposite Chambésy and opposite Genthod the depths of 40 mètres and 49 mètres respectively, which are in complete agreement with the former measures of Sir Henry Delabeche and others. I beg leave here to present a few results of the soundings, 1100 in number, of Professor Guyot and Count Henri de Pourtalés in the Lake of Neuchâtel. The length is 38,000 mètres, ending, at the lower extremity, in a shoal of 30 square kilomètres, with a depth of 20 feet only. At the head of the lake, near Yverdon, it ends with a similar shoal, with a depth of 30 feet and an extent of 3 square kilomètres only. The northern shore at the foot of the Jura has an average depth of 400 feet, 444 at most, south of Cortaillod. On the south-east shore the waves seem to have worn out at their base, and cut, as a steep wall, the hills of sandstone which form the peninsula called Vully. From the materials thus torn from the hills a third shoal has been formed, with 9 to 20 feet of water, lining the shore on a line of 32 kilomètres, called the *blanc fond* (white bottom) by the fishermen. Thus a decrease of 20 feet only in the level of the waters would bring about a reduction of about 70 square kilomètres, or almost a third part of the lake. But the most curious feature revealed by M. Guyot's soundings is the existence of a longitudinal crest, parallel with the line of deep waters on the north-west shore and the shallow waters of the south-east shore, made of a steep range of sandstone, like St. Peter's Island, in the Lake of Bienne, and where the depth does not exceed 30 feet, so that an uprising of 100 feet of the land, or the subsiding of 100 feet in the water, would completely alter the shape of the lake.

PAUL CHAIX.

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5. *Hypsometrical Observations in the Central Alpine Chain of Switzerland.* By J. M. ZIEGLER, Corresponding Member R.G.S.

THE granitic masses of Bernina and Albigna form geologically as well as topographically the eastern pendant to Mont Blanc, in the central Alpine chain. The configuration of their eastern and southern slopes was until lately very little studied. Your Corresponding Member devoted nearly eight years to this task. This led him to consult very often the topographical map of the Lombardo-Venetian Staff, a good work as far as it extends (not reaching the highest mountain parts), but even there the surveyors evinced great talent in mapping. A very great hindrance was caused by a want of sufficient data for altitudes. To fill up partly this gap I made successive measurements by the aneroid on Italian territory, taking my start from the nearest Swiss meteorological stations (Zernetz, Brusio, Castasegna, and Sils).

The following list is a selection from my numerous hypsometrical determinations, given in mètres :—

1. *District of Bormio.*

	Mètres.
St. Antonio di Livigno	1860
Motta della Neve	2805
Forcola di Trepalle	2214
Val Valaccio (the most southern drain of the Inn) ..	1989
Passo Foscagno (water parting of Danube and Po rivers)	2303
Isolaccia, village foot of Foscagno, Mont Val Viola ..	1356
Ponte Pischino, village Premadio, Val Viola	1310
Bagni Nuovi di Bormio	1340
Ponte di Ceppina, Val di Sotto	1102
Ponte della Serra	1024
Monte de' Piazzi (after Weilenmain)	3570
Colle Verva (between V. Viola and V. Grosina)	2400
Confluence of Roarca Torrent and Adda River, Grossotto	586

2. *Val Lanterna.*

Passo della Tempesta (opposite Psso. Canciano, Poschiavo)	2560
Alpe Fellaria (close to the glacier of the same name) ..	2236
Lauzada village	1160
Confluence of Lauterna Torr and Malero Torrent	970

3. *Val Malenco.*

Colmo d' Entova (saddle of Fex glacier and Scerscen glacier)	3226
Foot of Passo Muretto	2166
Alpe d' Oro	2042
Chiareggio	1668
St. Giuseppe	1527
Chiesa, principal village of the valley	1078
Torre, Ponte del Malero	942

4. *Val Masino.*

Bagni del Masino	1326
St. Martino	1135
Val Masino village	990
Pont di Chino	645
Osteria del Masino, Lower Val Tellina	345

J. M. ZIEGLER.

Winterthur, Palmgarten, 31st March, 1873.

PRIZE MEDALS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

PRIZE MEDALS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

	Physical Geography.	Political Geography.
1869.		
Gold Medal	Grundy.	Richmond.
Bronze Medal	Gent.	Wilde.
Honourably Mentioned	Butler, Stewart, Wilson, Brown, Thomas.	Crabb, Collins, Lewis, Dixon, Bontflower.,
1870.		
Gold Medal	Butler.	Gent.
Bronze Medal	Stewart.	Collins.
Honourably Mentioned	Hind, Hughes, Beckly, Hunt, Shawe, Thomas.	Crabb, Grundy, Hogben, Murray, Dixon.
1871.		
Gold Medal	McAlister.	Hogben.
Bronze Medal	Collingwood.	Arkle.
Honourably Mentioned	Lundie, Shaw, Hudson, Beckley, Disney, Evill, Brown, Ffooks.	Sparks, Heath, Bontflower, Hassall.
1872.		
Gold Medal	Spring-Rice.	Collingwood.
Bronze Medal	Butler.	Graham.
Honourably Mentioned	Penrose, Dickson, White, Vane.	Sayle, Kingsford, Dixon.
1873.		
Gold Medal	Hudson.	Spring-Rice.
Bronze Medal	Forbes.	Nutt.
Honourably Mentioned	Cole, Reade, Hancock, Louis, Richardson, Pawle, Townsend, Widdicombe.	Williams, Kingsford, Sing, Saunders, Hassall.

PRIZE MEDALS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

INSTITUTED, 1869.

RESULTS OF THE EXAMINATION FOR 1873.

List of Schools who were invited to compete in 1873.

English Schools.—St. Peter's College, Radley, Abingdon; King Edward's School, Birmingham; Brighton College; Bristol Grammar School; Cathedral Grammar School, Chester; Cheltenham College; Clifton College; Dulwich College; Eton College; Haileybury College; Harrow; Hurstpierpoint; Liverpool College; Liverpool Institute; London,—Charter House; Christ's Hospital; City of London School; King's College School; St. Paul's; University College School; Westminster School; Royal Naval School, New Cross; — Manchester School; Marlborough College; University School, Nottingham; Repton; Rossall; Rugby; King's School, Sherborne; Shoreham; Shrewsbury; Stonyhurst College, Blackburn; Uppingham School; Wellington College; Winchester College.

Scotch Schools.—Aberdeen Grammar School; Edinburgh Academy; Edinburgh High School; Glasgow High School.

Irish Schools.—Royal Academical Institute, Belfast; Dungannon Royal School; Ennis College; Portora Royal School, Enniskillen; Foyle College, Londonderry; Rathfarnham, St. Columba's College.

Sixteen of the above Schools furnished competitors, according to the following list, in which is entered the number of candidates in Political and Physical Geography from each school:—

	Physical.	Political.
Dulwich College	1	1
Bristol Grammar School	2	0
Haileybury College	3	0
Liverpool College	3	1
City of London School	3	0
Rossall School	1	1
St. Columba's College	0	2
Wellington College	4	0
Winchester College	4	0
Hurstpierpoint College	3	3
Uppingham School	0	2
King Edward's School, Birmingham	3	0
University School, Nottingham	2	0
Marlborough College	4	1
Eton College	4	1
University College School	0	2
Total	37*	15

The Examiners appointed by the Council for 1873 were Dr. J.D. Hooker, F.R.S., &c., for Physical, and Major-General Sir Henry C. Rawlinson, K.C.B., for Political Geography. The examinations were held at the various schools, on the 17th of March, and the Prizes were presented at the Anniversary Meeting of the Society on the 26th of May.

PHYSICAL GEOGRAPHY.

No. 1 Examination Paper, 1873.

General.

(1). What is the approximate distance in geographical miles between Table Bay, Cape of Good Hope, and the Derwent River, Tasmania; what prevalent winds and currents would a ship meet with in making a straight course between these places; and would the straight course be the best under all circumstances;—if not, why not?

(2). What is the approximate distance in geographical miles between Auckland, New Zealand, and Valparaiso; what prevalent winds and currents would a ship meet with in making a straight course between these places; and would the straight course be the best under all circumstances;—if not, why not?

[One only of the above questions to be answered.]

(3). What are the relative levels of the Black Sea, Caspian Sea, and Aral Sea? Contrast briefly the physical features of those seas.

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* Of these, four were withdrawn through illness or other causes:—one each from the City of London School, St. Columba's College, University School, Nottingham, and Marlborough College: leaving the numbers actually competing, thirty-five in *Physical*, and thirteen in Political Geography.

(4). Compare the Mississippi and the Ganges in respect of
1. Their feeders.
2. The levels of their beds.
3. The relative amount of organic matter they carry into the sea.

(5). What great rivers have materially changed their courses within the Historic period?

(6). Classify as many rivers of the first magnitude as occur to you, according to the physical features of their sources.

(7). Place in order of their magnitude in area the following islands:—Ceylon, Cuba, Dominica, Ireland, Jamaica, Java, Madagascar, Sardinia, Spitzbergen, Sumatra, Trinidad.

(8). Define a glacier by its physical features.

(9). Enumerate the principal active Volcanos, classifying them according to the volcanic systems to which they belong, and distinguishing the Insular from the Continental.

(10). What are the more remarkable phenomena of the Red Sea?

(11). To what causes, general or local, or both, are the following phenomena due?—

An excess of heat from solar radiation.
An excess of aqueous vapour in the air.
Excessive cold from terrestrial radiation.
A low barometric pressure.

No. 2 Examination Paper, 1873.

Special.

1. Eastern Turkistan.

(1). What is the mean elevation of the floor of its valley, and from what data is this obtained?

(2). What are its principal rivers, their courses, features, and destinations?

(3). What characters would you assign to its summer and winter winds?—and why?

(4). To what is the fertility of its valleys due, and to what the absence of forests?

(5). Enumerate the principal field-crops, and state which of the staple food-crops of Western Europe are wanting.

(6). To what circumstances is the cultivation of tropical plants at the elevation and in the climate of Yarkand due?

(7). To what races of man do the inhabitants belong? Distinguish the indigenous, the settled immigrants, and the principal casuals.

2. Western Turkistan.

(8). Enumerate its principal rivers, distinguishing those that empty into seas, and those that do not: how do the latter terminate, and to what physical causes may such terminations be due?

(9). Compare the climates and physical features of Eastern and Western Turkistan; are they equally healthy?—if not, why?

3. Western Tibet.

(10). How does the climate of the mountains and valleys north of the Indus in its westerly course differ from that of the mountains to the south of that river?

(11). What are the prevailing winds at the heads of the higher valleys of Tibet, and to what are they due?

(12). What are the prevalent characters of the Tibetan Lakes?

(13). Draw a section through Eastern Turkistan and Tibet from Yarkand to Leh, giving the names and approximate altitudes of the principal valleys and ridges crossed.

POLITICAL GEOGRAPHY.

No. 1 Examination Paper, 1873.

General.

[*Candidates are not to answer more than* **Twelve** *Questions in this Paper.*]

(1). What States or Provinces are traversed by a direct line drawn between the following places:—1. London and Calcutta. 2. St. Petersburg and Algiers. 3. Lima and Monte Video? State the distance, in geographical miles, between the places.

(2). Give the ethnology, population, form of government, and chief commercial relations of the countries traversed by line No. 1 of the foregoing question.

(3). The same with regard to No. 2 of Question 1.

(4). The same with regard to No. 3 of Question 1.

(5). Give (approximately) the areas (in square miles) and population, at the last Census, of Great Britain, France, the German Empire, Japan, and the United States of North America.

(6). Compare the following groups of islands, with regard to area, geographical position, and climate, as affecting population, civilization, and commerce:—The British Isles; the Japanese Archipelago; New Zealand.

(7). Name the colonies and foreign possessions of France, Holland, Spain, and Portugal; and give an account of the geographical position, population, commerce, and mode of government of each colony or possession.

(8). What are the chief articles of export trade of European Russia, Egypt, Java, China, the Philippine Islands, Cuba, Brazil, and the Argentine Confederation?

(9). What are the chief facts regarding increase or decrease of population during the last thirty years in France, Great Britain, Ireland, and the United States of America?

(10). Compare the territorial extent of the Russian Empire in 1815 and 1872.

(11). What territorial and (internal) political changes have been brought about in Germany by the various events from 1864 to 1871?

(12). Draw a map of Europe, giving the political boundaries at the end of the sixteenth century.

(13). Give an historical sketch of European discovery and settlement on the East Coast of Africa.

(14). What was the extent of the knowledge possessed by the ancients (as far as records have been preserved) of the East Coast of Africa?

(15). Mention some of the chief migrations of peoples recorded in history, and others inferred from the present distribution of races.

6). Give the geographical distribution of the negro and negroid races.

7). Classify the various branches of the Arian race according to language, and name their present habitats.

8). What has been the influence on population and civilization of river valleys?

No. 2 Examination Paper, 1873.

Special.

[*Candidates are not to answer more than* **Eight** *Questions in this Paper.*]

1). Draw a map of Eastern and Western Turkistan, including conterminous states, from Lake Balkash on the North to Lahore on the South, and from the Caspian on the West to the meridian of Lake Lob on the East.

2). Give the geographical position, ethnological constituents, and political condition and religion of the Khanates or States of Eastern and Western Turkistan.

3). What are the chief facts in the history of Eastern Turkistan, from the time of Tamerlane to the year 1872?

4). How do the hydrographical conditions of Eastern and Western Turkistan affect the distribution of population and the industry of the inhabitants?

5). Describe the trade-routes between the chief towns of Eastern and Western Turkistan and India; giving the distances in geographical miles, and the obstacles to be encountered.

6). Trace the present southern frontier of Asiatic Russia, and describe the various routes conducting from the following points on that frontier to the Indus:—(1.) Mouth of the Atrek River; (2.) Mouth of the Oxus; (3.) Samarcand; (4.) Chadir-Kul Lake; (5.) Kuldja.

7). Name the principal travellers who crossed the Pamir Plateau from West to East during the Middle Ages, and those who have visited it in recent times.

8). What are the chief nationalities dwelling along the borders of the Oxus, from its source to its mouth?

9). Who are, or were, the following peoples of Central Asia?—Uigurs, Kafirs, Uzbegs, Sarts, Taranchis, Tungans, Kirghizes, Turcomans, and Calmucks?

10). Describe fully the affinities and distinctions between Manchūs, Mongols, and Turks.

11). Describe the geographical position of Tibet. How far does it extend towards the East, and what were considered to be its limits in that direction in Marco Polo's time?

12). What are the relations, political and ecclesiastical, between Tibet and China?

The following are the names of the successful competitors:—

PHYSICAL GEOGRAPHY.

		Age.	
Gold Medal	W. C. HUDSON	18	*Liverpool College.*
Bronze Medal	W. A. FORBES	17	*Winchester College.*

Honourably Mentioned.

	Age.	
A. C. COLE	18	*Eton College.*

R. C. READE	19	*Eton College.*
H. H. HANCOCK	15	*Bristol Grammar School.*
H. LOUIS	17	*City of London School.*
N. M. RICHARDSON	17	*Winchester College.*
G. S. PAWLE	17	*Haileybury College.*
G. R. TOWNSEND	17	*Haileybury College.*
W. S. WIDDICOMBE	16	*Haileybury College.*

POLITICAL GEOGRAPHY.

		Age.	
Gold Medal	S. E. SPRING-RICE	16	*Eton College.*
Bronze Medal	A. T. NUTT	—	*University College School.*

Honourably Mentioned.

	Age	
A. WILLIAMS	18	*Uppingham School.*
W. L. KINGSFORD	16	*Rossall School.*
G. H. SING	16	*Liverpool College.*
S. H. B. SAUNDERS	16½	*Dulwich College.*
A. HASSALL	19	*Uppingham School.*

REPORTS OF THE EXAMINERS FOR 1873.

I.—PHYSICAL GEOGRAPHY.

To the Council of the Royal Geographical Society.

GENTLEMEN, ROYAL GARDENS, KEW.

I have to report that 35 papers of candidates for the Prizes in Physical Geography were made over to me, which I have examined, with the following result:—

Gold Medal .. WILLIAM CLARK HUDSON.
Bronze Medal .. WILLIAM ALEXANDER FORBES.

Deserving of Honourable Mention.

ALFRED CLAYTON COLE.

REGINALD COLEBROOKE READE.
HERBERT HENRY HANCOCK.
HENRY LOUIS.
NELSON MOORE RICHARDSON.
GEORGE S. PAWLE.
GEORGE ROBERT TOWNSEND.
WILLIAM S. WIDDICOMBE.

I have no means of ascertaining their ages, schools, or colleges. The papers of the two Medallists, and of the first of the honourable mentions, were of nearly equal merit, and considerably better than those of the other competitors; but there was not a single paper amongst these latter which a candidate need regret having given in for competition.

The paper of the Gold Medallist was clearly the best—from his answering every question, his gaining marks for all, and his having the highest total.

The two next papers, in point of merit, failed to answer a very few questions, and got no marks for a very few others.

The answers given to the questions in the special subject were for the most part inferior to those in the general.

The Gold Medallist was second in number of marks, in both the general and special subjects, but so high in each that his total

number of marks outnumbered all competitors. On the other hand, the first in the general subject (Forbes) was third in the special; and the first in the special (Cole) was fifth in the general. Under these circumstances, I regard it as probable that had the papers been wholly general Forbes would have gained the Gold Medal, and that one of the honourable mentions might possibly have obtained the Bronze Medal.

On the whole, the questions requiring reflection were perhaps answered the best; and I think I detect in many of the candidates a want of grounding in the actual and relative positions of countries, a defect which often vitiated answers which showed a sufficient knowledge of natural phenomena, and power of applying it. I am disposed to attribute this to a defective education in the elements of Geography, the basis of which should be an accurate—but neither detailed nor minute—knowledge of the positions on the globe of the various countries, seas, &c. To understand the climate of a country the two primary considerations are—first a reference to its latitude, *i.e.*, its position relatively to the sun throughout the year—its position relatively to environing areas and their conditions being the second consideration; a knowledge of the longitude of the place is also essential.

Now, there were not a few candidates who, whilst showing a fair or even good knowledge of the winds and currents of the Indian and Southern Oceans, evidently did not know the positions of the Cape and Tasmania, relatively either to those winds and currents, or to one another, even the distance between these points being variously given from 1200 to 9000 miles (one gave 550, possibly a clerical error for 5500). Errors, such as these, would have been impossible had the candidates been taught by a map or globe (not by book or rote) the places traversed by the six principal parallels (the equator, tropics, the polar circles, and the latitude of Greenwich), and by eight equidistant meridians, beginning with that of Greenwich, especially noting the points of intersection of these lines, and the important places near those points.

I am,

Your obedient Servant,

Jos. D. Hooker.

II.—POLITICAL GEOGRAPHY.

To the Council of the Royal Geographical Society.

1, Savile Row,
Gentlemen, Burlington Gardens, W.

I have to report the following as the result of the Examinations for the present year in Political Geography:—

1. **Gold Medal** .. S. E. Spring-Rice.
2. **Bronze Medal** .. A. T. Nutt.

Honourably Mentioned.

A. Williams.
W. L. Kingsford.
G. H. Sing.
S. H. B. Saunders.
A. Hassall.

Thirteen boys only competed this year in the branch of Geography entrusted to my direction in the Examinations. I have little to remark of a general nature concerning their work, which, with scarcely an exception, displays a fair amount of knowledge of the subjects embraced by the questions answered. The Gold Medallist surpassed the next competitor on the list by a long interval, and his papers are remarkable for clearness and precision of expression, as well as for extent and accuracy of information. His paper on the special subject was not, however, quite so good as that of the Bronze Medallist, who, on the other hand, fell far short in the general paper. The Bronze Medallist might probably have approached nearer in total of marks the chief prize-man, if he had taken up the full number of questions in the general subject, viz., twelve, he having attempted only nine. The three next on the list succeed each other by nearly equal gradations of merit; the fifth and sixth are separated by a rather longer interval, and are nearly equal to each other.

I have not noticed any marked superiority of the papers on the special over those on the general subject. Most of them, indeed, show signs of attentive reading of some of the numerous books

which the Prizes Committee recommended for study; but, on the other hand, the more difficult questions, or such as were not treated of in those works, were generally answered vaguely.

The map set in Question 1 was attempted by nearly all, and it is satisfactory to note that the relative positions of places were almost always given with considerable accuracy, although the maps were roughly drawn.

(Signed) H. C. RAWLINSON.

PROGRAMME FOR 1874.

THE Council of the Society have satisfaction in repeating the offer of Prize Medals for the ensuing year, and have invited the following Public Schools to take part in the competition:—

List of Schools invited to compete in 1874.

English Schools.—St. Peter's College, Radley, Abingdon; King Edward's School, Birmingham; Brighton College; Bristol Grammar School; Cathedral Grammar School, Chester; Cheltenham College; Clifton College; Dulwich College; Eton College; Haileybury College; Harrow; Hurstpierpoint; Liverpool College; Liverpool Institute; London,—Charter House; Christ's Hospital; City of London School; King's College School; St. Paul's; University College School; Westminster School; Royal Naval School, New Cross;—The College, Malvern; Manchester School; Marlborough College; University School, Nottingham; Repton; Rossall; Rugby; King's School, Sherborne; Shoreham; Shrewsbury; Stonyhurst College, Blackburn; The School, Tonbridge; Uppingham School; Wellington College; Winchester College.

Scotch Schools.—Aberdeen Grammar School; Edinburgh Academy, Edinburgh High School; Glasgow High School.

Irish Schools.—Royal Academical Institute, Belfast; Dungannon Royal School; Ennis College; Portora Royal School, Enniskillen; Foyle College, Londonderry; Rathfarnham, St. Columba's College.

Syllabus of Examinations for the Prize Medals of the ROYAL GEOGRAPHICAL SOCIETY *in* 1874.

EXAMINATION IN PHYSICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, according to printed regulations (which will be forwarded in due time), on the third Monday in March, 1874, and will consist of two papers of three hours each; the one to be answered between 9 and 12, 9½ and 12½, or 10 and 1 A.M. (according to the convenience of the School); and the other between 2 and 5, 2½ and 5½, or 3 and 6 P.M.

No. 1 *Examination Paper* will consist of questions on the following subjects:—

A. *Configuration of the Earth*, as learnt by careful study of a globe. What are the distances, speaking roughly, between such remote places as may be specified? What places of importance lie on the direct lines between them, and what is the section along each? What are the relative size, elevation, &c., speaking roughly, of such well-known districts, mountains, and rivers, as may be specified?

B. *General Physical Geography.* — Distribution of land and sea, forests, plateaux, glaciers, volcanoes, man, animals, plants and minerals, climates and seasons, oceanic, meteorological and magnetic phenomena.

*** Extra marks will be allowed for sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. The use of blue and red pencils is permitted for this purpose. No marks will be given for neatness of execution, apart from accuracy.

The candidates may be required to construct a rough map without the aid of special instruments, but from a brief description of a district illustrated by itineraries and bearings.

No. 2 *Examination Paper* will consist wholly of questions on a special subject.

The special subject appointed for 1874 is—

THE BRITISH ISLES.

EXAMINATION IN POLITICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, at the same hours and under precisely the same regulations as those in Physical Geography.

No. 1 *Examination Paper* will consist of questions on the following subjects:—

A. *Descriptive Geography.*—Explanation of latitude and longitude. What are the distances in geographical miles, speaking roughly, and as learnt by the careful study of a globe, between such remote places as may be specified? What places of importance lie on the direct line between them? What is the relative size, speaking

roughly, of such well-known countries, mountains, and rivers, as may be specified?

B. *Historical Geography.*—Embracing (1) the boundaries of states and empires at different historical periods; (2) the chief lines of commerce, ancient and modern; (3) the influence of geographical features and conditions upon the distribution of races and political history of mankind.

No. 2 *Examination Paper* will consist wholly of questions on a special subject.

The special subject appointed for 1874 is—

THE BRITISH ISLES.

*** Extra marks will be allowed for maps and sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. The use of blue and red pencils is permitted for this purpose. No marks will be given for neatness of execution, apart from accuracy.

The candidates may be required to construct a rough map without the aid of special instruments, but from a brief description of a district illustrated by itineraries and bearings.

The following books and memoirs contain much information regarding the Historical, Political, and Physical Geography of the British Isles.

1. 'Physical Geology and Geography of Great Britain.' By Professor A. C. Ramsay (third edition). London, Stanford. 1872. 7*s.* 6*d.*

2. The Scenery of Scotland viewed in connexion with its Physical Geology. By A. Geikie. London, Macmillan. 1865. 10*s.* 6*d.*

3. 'Historical Maps of England.' By C. H. Pearson. London, Bell and Daldy. 1870. 31*s.* 6*d.*

4. 'Words and Places.' By I. Taylor. London, Macmillan. 1873. 6*s.*

5. 'The Celt, the Roman, and the Saxon.' By T. Wright. London, Hall, Virtue, and Co. 1861. 12*s.*

6. 'The Geography of British History.' By W. Hughes. London, Longmans. 1866. 8*s.* 6*d.*

7. The Articles on the subject in Knight's 'English Cyclopædia of Geography,' and Supplement to the same. London, Bradbury and Evans. 1854. 42*s.* and 15*s.*

*** Candidates in Physical Geography will be expected to have a knowledge of the first two on the list.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 28TH, 1873.]

SESSION 1872-3.

Twelfth Meeting (ANNIVERSARY), 1 P.M., *May 26th*, 1873.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Henry Warington Smyth Baden-Powell, Esq.; Henry William Empson, Esq.; Robert U. Penrose Fitz-Gerald, Esq.; S. Harwood, Esq.; Lieutenant Swinton C. Holland*, R.N.; *Professor Leone Levi*, F.S.A. (Consul-General for Paraguay); *Captain Crawford Pasco*, R.N.; *Admiral J. C. Prevost; Lieutenant Henry S. Hutton Riddell* (1st Battalion 60th Rifles).

The proceedings commenced by the Secretary (Mr. C. R. MARKHAM) reading the Rules relating to the Anniversary Meetings.

The Minutes of the last Anniversary Meeting were then read and confirmed, and Captain FELIX JONES and Dr. WEBSTER appointed Scrutineers of the Ballot.

After which, the Secretary read the Report of the Council for the past year. On a motion made and seconded, the Report was adopted.

The presentation, by the PRESIDENT, of the Gold Medals for the encouragement of Geographical Science and Discovery next followed. The FOUNDER'S MEDAL was awarded to Mr. NEY ELIAS, for the enterprise and ability he displayed in surveying the new course of the Yellow River of China, in 1868; and for his recent journey through Western Mongolia, viâ Uliassutai and Kobdo, during which he had taken a large series of observations for fixing positions and altitudes. The Medal was received and acknowledged by Mr. Elias in person.

The PRESIDENT reminded the Meeting that the PATRON'S MEDAL was awarded in October last to Mr. H. M. STANLEY, for his discovery and relief of Dr. Livingstone, and had been since transmitted to him in America through the United States Minister.

A Gold Watch was awarded to Mr. THOMAS BAINES, for his long-continued services to Geography, and especially for his journeys in South-Western and South-Eastern Africa; the PRESIDENT announced his intention of himself presenting it to Mr. Baines, on that gentleman's return to England.

A Gold Watch, awarded to Captain CARLSEN, for his discoveries in the Arctic Seas, and for having circumnavigated the Spitzbergen as well as the Nova Zembla Groups, was presented to His Excellency Baron HOCHSCHILD, the Swedish Minister, who attended to receive it on behalf of Captain Carlsen.

The PRESIDENT, before delivering the Medals awarded to the successful candidates in Physical and Political Geography, from the Public Schools, called upon Mr. Francis Galton (Chairman of the Committee) to address the Meeting and communicate the Reports of the Examiners (Dr. J. D. Hooker and Sir H. C. Rawlinson) for 1873.

Mr. F. GALTON, in reading the Report of the work of the Committee, mentioned that the number of competing schools and of candidates was on the increase, and gave extracts from letters sent by the Head Masters of the Chief Public Schools, in reply to a circular issued by the Committee, inviting criticism and suggestions.

The Prizemen were then introduced to the President, by Mr. Galton and the Hon. G. C. Brodrick (members of the Prizes Committee), to receive the Medals, which were awarded as follows:—The Gold Medal for *Physical Geography*, to W. C. Hudson (Liverpool College); the Gold Medal for *Political Geography*, to S. E. Spring-Rice (Eton College); the Bronze Medal for *Physical Geography*, to W. A. Forbes (Winchester College); and the Bronze Medal for *Political Geography*, to A. T. Nutt (University College School).

After the presentation of the Medals, the following alterations in the By-laws of the Society were put to the Meeting.

Sir THOMAS FREMANTLE proposed that—The words in the following clause (4, Chap. I.) printed in Italics be omitted, and that the words "every year" be inserted in the place of "periodically":—

"A certain portion of the Council shall be changed *periodically*, viz., *the President every second year; and* one of the Vice-Presidents, and seven of the ordinary Councillors *every year;* the retiring individuals shall be selected by the Council, and shall not be re-eligible to the same office till the expiration of one year."

The motion was seconded by Sir ANDREW WAUGH, and carried unanimously.

Mr. F. GALTON proposed that—The words in Clause 8, Chap. V.,

"When two hours shall have elapsed from taking the Chair," be omitted, and the following inserted in their stead:—

"After the Medals have been delivered and before the commencement of the Address."

The motion was seconded by Dr. WEBSTER, and carried unanimously.

The Ballot was then proceeded with, and the Scrutineers declared the following gentlemen to have been elected as officers of the Society for the ensuing year, the names in Italics being those newly appointed:—*President:* Sir H. Bartle Frere, K.C.B., G.C.S.I., D.C.L. *Vice-Presidents:* The Earl of Derby; Major-General Sir H. C. Rawlinson, K.C.B., D.C.L., F.R.S.; Sir Rutherford Alcock, K.C.B.; Admiral G. H. Richards, C.B., F.R.S. *Trustees:* Lord Houghton, D.C.L., F.R.S.; Sir Walter C. Trevelyan, Bart. *Secretaries:* Clements R. Markham, Esq., C.B., F.S.A.; R. H. Major, Esq., F.S.A. *Foreign Secretary:* John Ball, Esq., F.R.S. *Councillors:* Admiral Sir George Back, D.C.L., F.R.S.; Hon. G. C. Brodrick; Sir Thomas Fowell Buxton, Bart.; Admiral R. Collinson, C.B.; *Earl Ducie*, F.R.S.; *A. G. Findlay, Esq.; James Fergusson, Esq.*, F.R.S.; Right Hon. Sir Thomas F. Fremantle, Bart.; Francis Galton, Esq., M.A., F.R.S.; *Major-General Sir F. J. Goldsmid*, K.C.S.I.; Lieut.-Col. James A. Grant, C.B., C.S.I.; John Murray, Esq.; Sir Charles Nicholson, Bart., D.C.L.; Admiral E. Ommanney, C.B., F.R.S.; Admiral Sherard Osborn, C.B., F.R.S.; *General C. P. Rigby;* S. W. Silver, Esq.; Warington Smyth, Esq., F.R.S.; Major-General Richard Strachey, R.E., C.S.I., F.R.S.; *Major Sir Harry C. Verney, Bart.*, M.P.; Captain C. W. Wilson, R.E. *Treasurer:* Reginald T. Cocks, Esq.

At the conclusion of the Ballot, the PRESIDENT read the Annual Address on the progress of Geography.

A vote of thanks to the PRESIDENT for the Address was then proposed and seconded, and unanimously agreed to.

PRESENTATION

OF THE

ROYAL AND OTHER AWARDS.

(At the Anniversary Meeting, May 26th, 1873.)

ROYAL MEDALS.

THE Founder's Medal for the year 1873 was awarded by the Council of the Society to Mr. Ney Elias, for the enterprise and ability he displayed in surveying the new course of the Yellow River in China, in 1868; and for his recent journey through Western Mongolia, *viâ* Uliassutai and Kobdo, during which he has taken a large series of observations for fixing positions and altitudes. The Victoria or Patron's Medal had been awarded in advance, on the 21st October, 1872, to Mr. H. M. Stanley, for his Relief of Livingstone, and for bringing his valuable journal and papers to England, as related in the 'Proceedings' of the Society, vol. xvi. p. 441.

The PRESIDENT made the following introductory remarks regarding the Medals of the year:—

"As our proceedings this year in regard to the distribution of the Royal medals are peculiar, perhaps it may be satisfactory to the Fellows if I give a brief explanation before calling up the Medallists. The Fellows are aware, then, that the Society presents two Gold Medals yearly to those who we think have rendered the greatest service to Geography at the time of the award. Last autumn, after the medals of the year had been presented, Mr. H. M. Stanley arrived in England, with the very gratifying intelligence that he had not only found and relieved Livingstone, but had travelled with him round the northern end of Lake Tanganyika, and had brought his journals, registers of observations, and other papers to

England. This service appeared to us of such importance that after due deliberation the Council decided to award to Mr. Stanley one of the medals of the following year, and as Mr. Stanley's stay in England was limited, I announced the award to him at a public banquet, which was given by the geographers in his honour before his departure to America. In due course the medals were prepared, and, with the approval of the Council, I at once forwarded Mr. Stanley's medal to America, through the United States Minister at this court, who duly acknowledged the honour. It appears, however, that before the medal reached America, Mr. Stanley had left for Spain, and it remains accordingly in the hands of Mr. Fish, the Foreign Minister of the United States, to await his return. I regret much that Mr. Stanley should not have been able to attend here this day in person to have received the medal at my hands, as I am sure we should have been glad of the opportunity of marking our appreciation of the really gallant service which he performed in relieving Livingstone, and of showing by the cordial reception of our Medallist that we are sincerely gratified at such honours having fallen to the lot of an American citizen."

On presenting the Founder's Medal to Mr. Elias, the President addressed him as follows:—

"Sir,—The Council of the Royal Geographical Society has for many years past watched with an ever increasing interest the ardour and ability which have been displayed by you in geographical research. The adventurous journey which you made in 1867 up the Tsien-tang River, and your careful exploration of its course for 140 nautical miles, with the aid of sextant and chronometer, were an earnest of your powers as a skilful and accurate surveyor. Those powers were brought more prominently before us when, in the course of the following year (in company with Mr. H. G. Hollingworth), you travelled 400 miles from Shanghai by the Grand Canal, and then conducted an exhaustive survey of the new bed of the Yellow River for 370 miles from Kai-fung to the sea. Of such importance, indeed, to geographical science, and so highly creditable to yourself, did my predecessor in this chair, Sir R. I. Murchison, consider the information to be which you were thus able to furnish regarding 'that remarkable phenomenon, the diversion by spontaneous movement of the waters of the great Hoang-Ho,' that he gladly gave a place in our Journal to your Map and Memoir, and further drew special

attention to your journey in his Anniversary Address for 1871. A supplementary memoir on the old course of the Yellow River, which you surveyed in 1870, was also published by us in the same volume of the 'Journal;' and it was noted to your particular credit, and as an example well worthy of imitation by travellers in little known countries, that you fixed all your positions by astronomical observation, and worked your traverses with the care and regularity of a professional surveyor.

"It has been, however, through your journey of last year from China to Europe that you have now taken rank among us as one of our most accomplished and successful travellers, and have thus secured the geographical blue ribbon of the year. To say that you have travelled from the Great Wall of China through the almost unknown steppes and mountains of Mongolia, a distance of nearly 2500 statute miles, to the Russian frontier, and have continued your route from that point for 2300 miles further to Nijni Novogorod, where the railway system of Europe first commences, would give a very inadequate idea of the value and importance of your journey. That which has influenced the Council of the Royal Geographical Society in awarding to you the Founder's Gold Medal of the year—even more than your being the only Englishman who has ever traversed the Asiatic continent from end to end upon this line—has been the indefatigable industry which you have displayed in carrying through your entire route a continuous series of observations. I find on referring to the register—1stly, that 231 astronomical observations have been taken by you for latitude and longitude; 2ndly, that altitudes are recorded at nearly every station (106) between Kalgan and Bisk, obtained either from boiling-point or aneroid observations, thereby giving a section of the whole route, which measures nearly 2000 geographical miles; and 3rdly, that a continued traverse was carried on between Kuei-hua-cheng and Suok, about 1340 geographical miles, without intermission. These are achievements which would reflect credit on the practised officers of our Engineer services, who are charged with great national geodetical operations. That they should have been accomplished, at his own expense, by a young amateur surveyor, who, in the words of Sir R. I. Murchison, 'pursued his travels in China through a pure love of geographical exploration, during holidays taken from active commercial pursuits,' does, indeed, strike one with astonishment.

"Mr. Ney Elias, in presenting to you this medal on behalf of the Council of the Royal Geographical Society, I take leave to record my opinion that you have performed one of the most extraordinary journeys of modern times, and one which, accompanied as it is with solid scientific results, will live in the memory of geographers, after travels which are the mere record of personal adventure have been long forgotten. I congratulate you, Sir, that, at so early an age, your name should be inscribed on our "golden roll" of geographers, and I feel assured that we may yet look to many future triumphs that await the continued prosecution of your travels."

Mr. NEY ELIAS replied:—

"Mr. President,—I have to express my most heartfelt thanks for the great honour you are bestowing on me to-day and also for your kind and encouraging remarks, and for the way they have been received by the Society. I have only to add, that at the same time that I accept with the utmost gratitude this much valued prize, I regret that circumstances did not admit of my carrying out the last journey as originally planned, and in a way that would have rendered it all the more worthy of so magnificent a reward. Nothing, however, can be more gratifying than to find our efforts so splendidly and so kindly rewarded, even though not attended by the fullest measure of success; and as it is I shall endeavour to regard this less in the light of laurels for the past than as an encouragement to future efforts, and shall make it my aim, in any further explorations I may be engaged upon, to maintain the Society's high reputation for geographical research, and endeavour to earn for it, rather than for myself, any possible distinction that lies in my power."

OTHER AWARDS.

A Gold Watch, with a suitable inscription, was awarded to Thomas Baines, for his long continued services to Geography, and especially for his journeys in South-Western and South-Eastern Africa, and the Route Maps constructed by him over large tracts of the interior.

The PRESIDENT, in announcing this award, stated that the watch would be presented to Mr. Baines on his return to England.

A similar watch was awarded to Captain Carlsen, for his dis-

coveries in the Arctic Seas, and for having circumnavigated the Spitzbergen as well as the Nova Zembla groups.

His Excellency Baron Hochschild, Swedish Minister, received the watch on behalf of Captain Carlsen, the President addressing him as follows:—

"Excellency,—The merits of your countryman, Captain Carlsen, are so conspicuous as a navigator and discoverer that the Council of the Royal Geographical Society of London have resolved to present him with a gold watch, in token of their admiration and esteem.

"In 1863, Captain Carlsen, in the brig *Jan Mayen*, circumnavigated Spitzbergen, being the only navigator who has ever accomplished this feat. In 1871 he also, in the schooner *Solid*, circumnavigated Nova Zembla, and discovered the relics of the famous Dutch Captain Barents, which are now preserved in the Museum at the Hague. At present he is serving on board the *Tegethoff*, in Lieutenant Payer's Austrian Expedition to the Arctic Seas, and will share in the credit of such discoveries as they may make along the Siberian coast.

"It will enhance, we think, the value of the honorary award which we desire to present to Captain Carlsen if your Excellency, as the representative in this country of his Majesty the King of Sweden, and yourself a zealous friend to Geography, will consent to convey to him the gold watch which I accordingly place in your hands."

BARON HOCHSCHILD, in receiving the watch, said:—"It is with great pleasure, Mr. President, that I act as the representative of Captain Carlsen on this occasion. It is a great honour to be deemed worthy of such a testimonial from the Council of the Royal Geographical Society, and I trust that Captain Carlsen will continue to labour in the same direction, and strive to achieve still more for science and civilisation."

PUBLIC SCHOOLS PRIZE MEDALS.

Mr. FRANCIS GALTON, on being called upon by the President to state (as Chairman of the Public Schools Prizes Committee) the results of the examinations of the year, spoke as follows:—

"It is my pleasing duty to announce that there has again been an

increase in the number of candidates for our medals, and of schools who have furnished those candidates. In 1871, 10 schools sent 25 boys; in 1872, 11 schools sent 38 boys; and in this year, 16 schools have sent 48 boys.* The reports of the Examiners, which will be published, show that the performance of the candidates is very creditable to them. Last year Eton entered the lists for the first time, and this year Winchester has also joined company: it is a great pleasure to us to witness the success of these old and renowned schools in our examinations.

"The Committee of Prizes, being anxious to inform themselves of the views of the Head Masters on their programmes of examination, circulated a few questions on various points, inviting criticism and suggestions. It has been a great gratification to us to be assured that in all important matters our efforts have given them much satisfaction. I will read short quotations from two of the letters as examples. In answer to an inquiry whether our examination accords fairly with the range of study at the schools, the Rev. Charles Abbott, D.D., Head Master of the City of London School, simply states—'The Papers do not "accord with the range of study" in my school as it is, but they accord with it as it ought to be.'

"The Rev. George Butler, Head Master of Liverpool College, who has furnished us with so many Medallists, has sent us a long and valuable communication full of instructive suggestions. He concludes by saying:—

"I desire to bear emphatic and grateful testimony to the good which has been effected by the Royal Geographical Society as represented by the Public Schools Prizes Committee. They have encouraged the study of Geography by offering liberal rewards. They have guided the studies both of Teachers and Pupils in the Public Schools by their published directions, and by the recommendation of books. And they have drawn the attention of *Book-Students* to the really *practical* ends for which Geography should be studied, by the

* The following are the awards of the Examiners for the year:—PHYSICAL GEOGRAPHY: *Gold Medal*, W. C. Hudson, age 18, Liverpool College; *Bronze Medal*, W. A. Forbes, age 17, Winchester College. *Honourably Mentioned*: A. C. Cole, age 18, Eton College; R. C. Reade, age 19, Eton College; H. H. Hancock, age 15, Bristol Grammar School; H. Louis, age 17, City of London School; N. M. Richardson, age 17, Winchester College; G. S. Pawle, age 17, Haileybury College; G. R. Townsend, age 17, Haileybury College; W. S. Widdicombe, age 16, Haileybury College.

POLITICAL GEOGRAPHY:—*Gold Medal*, S. E. Spring Rice, age 16, Eton College; *Bronze Medal*. A. T. Nutt, age —, University College School. *Honourably Mentioned*, A. Williams, age 18, Uppingham School; W. L. Kingsford, age 16, Rossall School; G. H. Sing, age 16, Liverpool College; S. H. B. Saunders, age 16½, Dulwich College; A. Hassall, age 19, Uppingham School.

appointment of Examiners, not only eminent for their literary and scientific attainments, but distinguished for their original researches and intimate knowledge of distant countries and their products. The acceptance by such distinguished men of the office of Examiners for the Public Schools' Prizes is of the highest value to the cause of Geographical study, not only because it ensures the highest order of examination, but because it enhances the value of any reward which the successful student may obtain."

"I will here remind the Society that, the subject of our special Paper of this year being Central Asia, we had the good fortune to secure for our examiners no less authorities than our own President, Sir Henry Rawlinson, for Political Geography, and the President Designate of the Royal Society, Dr. Joseph Hooker, the eminent botanist, and who was a celebrated traveller in former days in the Sikhim Himalaya, for Physical Geography.

"I will now beg your especial attention to the following paragraph in the Rev. Mr. Butler's letter, which, coming as it does from a Head Master of a school which has gained more than its quota of university honours, and who himself is a classical scholar of the highest distinction, very effectually meets objections that used to be frequently made to our examinations. He says:—

"'I may also bear testimony to the fact that time given to geographical study at school is no hindrance to academic studies. The three last instances of College and University honours gained by the pupils of Liverpool College bear out this. A scholarship and an exhibition at University College, Oxford, and a Bell University scholarship at Cambridge have within the last few weeks been gained by former Medallists of the Royal Geographical Society. It will be a satisfaction to the Committee to be assured that the encouragement given by them to literary and scientific pursuits of a general and in some sense of a popular character does not seem to weaken the power of application required to classical and mathematical studies.'"

Mr. Galton and the Hon. G. C. Brodrick introduced the prizemen to the President, who addressed the Gold Medallist for Physical Geography as follows:—

"Mr. Hudson,—I have the pleasure to present you with our first Gold Medal of the year, and congratulate you on this honourable testimony to your proficiency in the study of Physical Geography. The alumni of the Liverpool College occupy a prominent place among our prizemen, thereby testifying to the excellent course of geographical instruction pursued in that establishment. Believing, as I do, that such geographical studies form a most important element in the proper education of an English gentleman, I earnestly hope that the example of Liverpool College may be generally

followed, and that your own success may excite others to similar exertions."

Next followed the Bronze Medallist in Physical Geography:—

"Mr. Forbes,—You are the first prizeman, I believe, who has come up from Winchester College. I am delighted to find that the college, which has produced so many of our best scholars and statesmen, should have now admitted a systematic study of Geography into the curriculum of the school. I congratulate you on your success, and I trust that your fellow collegians will, in future, often come forward to compete for the Geographical Medals."

On the Gold Medallist for Political Geography being presented, the President thus addressed him:—

"Mr. Spring Rice,—I had the pleasure last year of presenting you with our Gold Medal for Physical Geography; this year you have borne off the same honour in Political Geography, being thus the only 'double first' who has yet appeared on our roll of prizemen. Having myself had the advantage of looking over your examination papers, I may say I have been astonished at the extent and accuracy of your knowledge of the Political Geography of Central Asia. Your success, certainly, does the greatest credit to your Eton training, as well as to your own ability and industry, and I heartily congratulate you on having gained the medal which I now put into your hands, and which, I hope, you will ever cherish as an honourable and proud distinction."

Mr. Nutt, the Bronze Medallist, being absent on the Continent, was represented by Mr. McGee, a master of the University College School. The President said:—

"I am happy to present you with the Bronze Medal, which has been awarded to your pupil as the second prizeman in Political Geography, and I will add that, judging from the general scope and correctness of his answers, his aggregate number of marks would have run the first prizeman very hard if he had taken up all the questions, instead of limiting himself to nine out of twelve. Geography must be well taught at University College School to have produced such a result, and Mr. Nutt must be a very ready and promising scholar. I sincerely congratulate you on your pupil's success."

The PRESIDENT, in conclusion, said:—

"Among those who have been honourably mentioned by the Examiners, and whose names I propose to read to you, Mr. Cole, of Eton College, the son of an old Fellow of our Society, has been brought so conspicuously forward that it has been determined to present him with an Atlas, so that he may rank immediately after the Medallists. I am informed that Mr. Cole and Mr. Spring Rice, who have thus shown such remarkable proficiency in geographical studies, are both excellent mathematicians, and also stand very high in Classics. And I am the more anxious to mention this circumstance as an impression has gone abroad that scientific pursuits, such as acquiring a knowledge of Physical and Political Geography, interfere with the study of Classics and Mathematics, whereas I believe that all such studies mutually assist each other, as they certainly contribute in almost equal proportions to form a thoroughly educated gentleman."

ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 26th May, 1873.

By Major-General Sir H. C. Rawlinson, K.C.B., etc.,
President.

Gentlemen,

I am glad to be able to address you again in this noble hall, where, by the kind favour of the Senate of the University of London, we are still permitted to hold our meetings. We have not altogether abandoned the hope that, in consideration of the services which we render to the public by facilitating the discussion of many questions of deep national interest, the Government may, sooner or later, see fit to provide us with suitable accommodation for our gatherings, either in a separate building or as joint occupants of some Central Hall of Science; but in the mean time we thankfully accept the generous assistance afforded us by the governing body of the University of London, and trust that they will find their reward, not merely in the grateful acknowledgements of a body of Geographers, but in the growing taste for Geographical studies which through their aid we have been enabled to diffuse abroad, to the great advantage of our national character as explorers and scientific travellers.

I am also happy that at this Anniversary Meeting, which terminates my allotted two years' tenure of office, I do not yield up a "damnosa hæreditas" into the hands of my successor, but that, on the contrary, I leave the Society in a more flourishing condition than it has ever previously attained—more flourishing in numbers, in income, in reputation, and, above all, in the extent of its sphere of usefulness. During the past year, as you have learnt from the Report of the Council, 225 new Fellows have been elected, which, after deducting losses by death and resignation, gives a net

increase to our numbers of 140—a larger reinforcement than we have received in any year since 1864. It is indeed with great satisfaction that I am able to announce that the Society, including Honorary Members, now numbers 2700 Fellows; that our annual income exceeds £6000; and that our capital, obtained from bequests, accumulations of subscriptions, &c., amounts to about £25,000, which is partly invested in the freehold property in Savile Row, and partly in public securities. Remembering also, as I do, that the prosperity of a Society like ours depends not so much on the number of its members, as on their knowledge and efficiency—not so much on the extent of its resources as on the purposes to which those resources are devoted, I am proud to be able to refer to the pages of the forty-second volume of the 'Journal,' which is now on the eve of publication, and to the record of our proceedings during the past year, as the gauge of our prosperous condition. Never, since our foundation in 1830, have we shown greater activity than during the period now under review, in fitting out expeditions, and furnishing correct Geographical information to the public. Three African expeditions have been organized under our auspices, two of which are now pushing their way into the interior from the east and west coasts respectively. We have revived also the long-slumbering but not forgotten question of Arctic discovery, and hope that, ere another year has passed over us, we may, in co-operation with other scientific bodies, have induced the Government to send an exploring expedition up Smith Sound towards the Pole. Our evening meetings have been numerously attended by all classes—from Princes of the Blood to the humble working student—all eager for information on that subject of special interest at the present moment, "the Geography of Central Asia;" and I believe I may say that, with the help of maps and diagrams and explanatory notices, the intelligent curiosity of the public on this topic has been amply gratified. Of our publications, too, we may be justly proud. The 'Journal' of the year is the largest we have ever published, containing as it does above 500 pages of most valuable Geographical matter, while we are also issuing gratuitously to the Fellows, a supplementary volume containing translations of the travels of the Portuguese in Central Africa. I must also notice the many valuable additions that have been made to our collection of maps. Under the discriminating guidance of Mr. Keith Johnston, application has been made to all the Governments of Europe for the most important Geographical documents which they have severally published, and the appeal has been nobly responded to, upwards of 3500

sheets having been during the year added to our store, equally valuable as specimens of the most elaborate Cartography and as records of the latest Geographical data.

OBITUARY.

Commodore Mathew Fontaine Maury.—This eminent Corresponding Member of our Society, of Huguenot descent, was born in the State of Virginia, on the 14th of January, 1806. At the age of nineteen he received an appointment as midshipman in the United States Navy, and in 1834 his first work, 'Maury's Navigation,' appeared, which was at once accepted as a text-book in the Navy of that country.

In 1837 he was promoted to the rank of lieutenant, and shortly afterwards met with the accident through which he was lamed for life. Being thus unable to perform the active duties of his profession, he devoted himself to advance its progress by Essays, some of which contributed greatly towards the establishment of a naval academy. In 1842 he was appointed Superintendent of the Depôt of Charts and Instruments at Washington, when he at once commenced that task of unravelling the winds and currents of the ocean, and measuring its depths, which has rendered his name so famous throughout the world.

The charts and sailing directions published by him shortened the passage to California by 30 days; to Australia, by 20 days; and to Rio Janeiro, by 10 days. They led to the Meteorological Conference at Brussels, when a system of general observation on meteorology and hydrography was agreed to and afterwards adopted by the civilised world.

The illustrious Humboldt declared him to be the founder of a new science, and every commercial country acknowledged the value of those services which, in general terms, may be said to have reduced the period of transit across the ocean one-fourth. The results of his labours and investigations were given to the world in his well-known work, 'The Physical Geography of the Sea,' which has been translated into the languages of France, Germany, Holland, Norway, Spain, and Italy. As a thorough practical man, all his labours had for their main object the security and economy of time in navigation.

Occupying a highly responsible position in the service of his country, he did not hesitate when his State, Virginia, seceding from the Union, called upon him for his services, to resign his position in

the Federal navy. We, gentlemen, have nothing to do with that great struggle; but we may rest assured that the pain of severance from the Union was greatly enhanced by the feeling that in so doing he in a great measure had to abandon the labour of his life.

This resignation led to his residence in this country for a considerable period, and we had consequently the advantage of hearing his opinion at several meetings of this Society, and opportunity was taken to pay a tribute to his services in the furtherance of navigation by a public dinner. The University of Cambridge conferred upon him the degree of LL.D., and the Emperor Napoleon invited him to the Superintendency of the Observatory at Paris. He preferred, however, when the war was over, to accept the Chair of Physics in the Virginia Military Institute; here, surrounded by his family and friends, he displayed the same vigour and energy which had characterised his whole life, and he so gained the confidence and kind feeling of the Academic Board that, when it pleased God, on the 1st of February, 1873, to remove him from this world, it was ordered that the library-hall of the Institute should be draped in mourning for thirty days.

There is a feeling abroad that one who has done so much for navigation and commerce should not be allowed to pass away without an acknowledgment from this generation, which has benefited so greatly by his labours; and it is proposed to hand down his memory by a monument similar to that which was erected to the memory of Horsburgh. It is hoped, therefore, that an international lighthouse may be established, which will by its name convey to future ages the estimation in which the services of Commodore Mathew Fontaine Maury were held.

P. M. G. VAN DER MAELEN, another of our Honorary Corresponding Members whose loss we have to lament, was a distinguished Belgian geographer, known as the founder of the *Établissement géographique* of Brussels, which dated from the year 1830, and to the management of which he devoted all his talent and energy. Like our own Arrowsmith, the maps and atlases he produced in the course of a long and industrious life are too numerous to specify. His first great work was the 'Atlas Universel,' in six volumes, which appeared in 1827; quickly followed by his second, the 'Atlas de l'Europe,' containing 165 maps, which was published in 1829. These two works met with great success, and obtained for him a European reputation as a cartographer.

The Royal Academy of Belgium admitted him as a member in 1829, and medals were decreed him by the Société de Statistique universelle of Paris and the Société des Lettres et Sciences du Tibre in 1830 and in 1831. During the years 1831–8 appeared in succession the eight volumes of his 'Dictionnaires géographiques des Provinces d'Anvers, des deux Flanders, du Hainaut, de Namur, de Liège, du Limbourg et du Luxembourg." Van der Maelen remained in full activity almost to the last day of his long and successful life. At seventy-four years he pursued his daily routine with the same vigour and regularity as he had done throughout. Indeed he was at that time occupied on one of his larger works, a new map of Belgium on a large scale, and in twenty sheets. This work he did not live to complete. He was seized with an intestinal inflammation, which carried him off on the 29th of May, 1869.

JOAQUIM JOSÉ DA COSTA DE MACEDO was the son of Agostinho José da Costa de Macedo, a distinguished professor of philosophy, and was born in Lisbon in the year 1777.

Senhor Macedo held the post of perpetual secretary to the Royal Academy of Sciences of Lisbon. He was a Councillor of the King of Portugal and a Gentleman of the Royal Household. In 1856 he was invested in the high office of *Guarda Mór de Real Archivo*, equivalent to our Master of the Rolls.

Retired from active service, he died on the 15th of March, 1867, in the village of Gollegã (district of Santarem), in the 90th year of his age.

Besides his speeches at the Royal Academy of Lisbon, which have been published in the collections of that scientific body, he was the author of the following works:—'Contributions to the History of the Voyages and Discoveries of the Portuguese. 1819.' 'Additions to the above mentioned. 1835.' 'A Memoir, in which it is intended to prove that the Canary Islands were unknown to the Arabs before the Portuguese. 1843.' 'On the state of Arabian Navigation in the time nearest to Islamism, and on the Arab Invasion of Spain. 1849.' 'A Memoir on the Place from whence the Religious Doctrines of Paganism were spread through Asia. 1849.' 'On the knowledge of the Greek Language, and of its Literature in Portugal, to the end of the reign of D. Duarte. 1854.'

This eminent Portuguese *savant* was elected Honorary Corresponding Member of our Society in 1863.

FERNANDO DA COSTA LEAL, one of our Honorary Corresponding Members, was born at Oporto in 1825. He was the son of

Fernando da Costa Leal, Lieutenant-General in the Portuguese Army.

After concluding his studies in the Royal Military College, he entered the infantry arm of the service in August 1842. In 1853 he reached the rank of captain, and was appointed aide-de-camp to the Governor-General of Angola. In 1856 he was appointed Governor of Mossamedes (Little Fish Bay), in South-West Africa, a post which he filled until 1859, and to which he was re-appointed in 1862, having served in the meantime in Angola as lieutenant-colonel of the garrison. In 1868 he was appointed Governor-General of Mozambique, where he died, eight months after he had taken possession of his governorship, on the 29th December, 1869, in the 44th year of his age, mourned by all who were acquainted with his virtues and noble character. His name, owing to his great ability and integrity, must be quoted among the most worthy functionaries of the Portuguese colonies. He was a Councillor of His Most Faithful Majesty, an officer of the Most Noble Order of the Tower and Sword, and a knight of the Order of S. Bento de Aviz, and of Our Lady of the Conception of Villa Vicosa.

The map of Angola, published in Lisbon in 1863, on a large scale (two sheets), and subsequently (1864 and 1870) on a smaller scale, was drawn by the Marquis de Sa' da Bandèira, conjointly with Senhor Fernando da Costa Leal.

In the 'Annaes do Conselho Ultramarino' may be found several interesting reports on Mossamedes, sent by this distinguished Portuguese officer to his Government.

REV. ADAM SEDGWICK.—By the death of this eminent geologist, one of the original members of our Society, and for many years a fellow-worker in his special branch of science with our late President, Sir Roderick Murchison, our Society has sustained one of its severest losses during the past year.

Professor Sedgwick was born on the 22nd of March, 1785, at Dent, in Yorkshire, his father being at the time vicar of the parish, and a man of much local influence. In 1804 he entered at Trinity College, Cambridge, where he took his bachelor's degree in 1808, classing as fifth Wrangler. In 1810 he was elected to a Fellowship of his college, and in 1818 was chosen to fill the Chair of Geology founded by Dr. John Woodward. He was ordained in the same year, and was also elected a Fellow of the Royal Society. It is recorded that his knowledge of geology at the time of entering on the duties of the Woodwardian Professorship was of the most scanty descrip-

tion; but he applied himself conscientiously and energetically to study, both in the field and in the closet, and so effectively that in two years we find him communicating to the Cambridge Philosophical Society a paper on the physical structure of Devonshire and Cornwall. In the early years of his Professorship he employed his winters in study at Paris, where he benefited by the instructions and acquired the friendship of Cuvier and Blainville. The first paper which he published in conjunction with Sir Roderick Murchison was "On the Structure and Relations of the Deposits contained between the Primary Rocks and the Oolitic Series in the North of Scotland," and bears the date of 1828. Others followed in succession in the years from 1831 to 1842; some of them on the geology of different parts of Continental Europe which he visited in company with Sir Roderick during this period. In 1829 Sedgwick was elected President of the Geological Society, and in 1833 was President of the British Association, which met that year in Cambridge. In 1871, after half a century of successful labour, he resigned his professorial chair.

It is not the place here to dilate on Sedgwick's labours as a geologist, or to enter into the controversy in which he was engaged in the later years of his life, with Murchison and others, regarding the limits of the Cambrian and Silurian systems. It is sufficient to state that he was one of those vigorous workers at this comparatively early stage of the science who established the principles on which Geology as a science must rest; and he was equally eloquent and forcible as a speaker and as a writer.

He died on the 27th of January, 1873, in the 88th year of his age.

Mr. JOHN ARROWSMITH.—This eminent geographer was the last of a family which has held the foremost rank in our science for a great portion of a century, and was one of the few remaining Fellows who aided in establishing our Society in 1830. Since that period he has been familiarly known to most of us, and in 1862 he received our Patron's Gold Medal for the very important services he had rendered to Geographical Science. He belonged to an old family in the southern part of Durham, and was born on a farm at Winston, a picturesque village on the banks of the Tees, 6 miles east of Barnard Castle, on April 23, 1790; he died in Hereford Square, Old Brompton, May 2, 1873, having just completed his 83rd year.

He received but an imperfect education, and came to London February 14, 1810, to join his uncle, Aaron Arrowsmith (who was

a native of the same locality as himself), and who had then attained great distinction as a geographer. Aaron Arrowsmith, senior, commenced his career with Mr. Faden, at a period when geographical discovery was so vigorously pursued at the end of the last century, and John Arrowsmith aided his uncle in the production of very many noble maps and charts, which were given on a scale almost unknown in modern cartography. His uncle died in Soho Square in 1822, and was succeeded by his sons, Aaron and Samuel. Aaron Arrowsmith, junior, constructed the well-known Eton Atlas of Comparative Geography, but soon left the profession and graduated at Magdalen College, Oxford. While there, he drew the maps of the once popular Bible Atlas, which was published under his brother Samuel's name. He took holy orders, and died about 1861.

John Arrowsmith, soon after his uncle's death, left his cousins and commenced his excellent London Atlas. After several years of unremitting toil, during which he lived with the utmost frugality, the first edition was published in 1834. It is reviewed in the 'Journal of the Royal Geographical Society,' vol. iv. p. 320. This fine work at once established his fame. He subsequently greatly extended this atlas, and also produced a very large number of other important works. It is only by a retrospect that we can judge of the extent of his labours, and there is scarcely a map now extant that does not bear the impress of his patient toil in the collection and arrangement of materials, often most crude and discordant, to show the progress of discovery. Thus the first work he performed for our Society was a map of the journeys (up to 1832) of his friend, Captain Sturt, our medallist, in Southern Australia. The results of this exploration, which traced the course of the Murrumbidgee and Murray Rivers to the sea, decided to a great degree the controversy which then raged as to whether the interior of Australia was a vast inland sea or a burning desert. How steadily Mr. Arrowsmith worked with the materials which subsequently flowed in is shown by the present maps of Australia, now almost covered by travellers' routes, and which owe their present form very much to his views. He has left some very fine and elaborate maps of each of the great Australian colonies unfinished, and awaiting the perfection he wished for, but could never attain. The second map he executed for the Society was the one drawn by our respected medallist, Sir George (then Captain) Back, of his terrible journey on an errand of mercy to the Arctic Sea, down the Great Fish or Back River, in 1833-4. This was the commencement of that noble series of enterprises which

afforded our geographer for many years an ample field for his powers, and these were fully occupied on all the northern countries between the Atlantic and Pacific Oceans.

His cousin Samuel died in 1839, and he then purchased a part of the collection made by his uncle Aaron, together with the house, No. 10, Soho Square, where he lived till 1861, at which date he gave up his more active occupations. While living there, he worked earnestly and conscientiously on African discovery for his friend Dr. Livingstone, while that prince of travellers was encountering and surmounting difficulties, till then unheard of.

To enumerate the various works on which he has been engaged would form a long list, and very many of them are still unpublished. It may be affirmed that no man arrived at higher excellence in cartography, or bestowed more care or patience in endeavouring to attain it; no man was actuated by a more earnest spirit in his profession, which he pursued, without regard to emolument, to the last day of his long life.

Sir George Pollock.—The late Field-Marshal Sir George Pollock, G.C.B., had been for twenty years one of our associates, and in 1856–7 served as Member of Council. This distinguished officer was the son of Mr. David Pollock, a Westminster tradesman, and was born in 1786, the youngest of three brothers, all of whom rose to eminence in their respective professions. He is recorded to have received his early education at the Woolwich Academy; and as early as the year 1802, when scarcely 18 years of age, he commenced his military career as Cadet in the East India Company's service. He obtained his commission as Lieutenant in the Royal Artillery in time to take a conspicuous part in the brilliant campaigns of Lake and Wellesley in the years succeeding 1803. He was present at the storm and capture of Dieg; and gained distinction in the trenches of Bhurtpore in 1805. At the close of the same year he was selected by Lord Lake to command the Artillery with the detachment under Colonel Ball, which was sent in pursuit of Holkar. In 1818 he was appointed Brigade-Major, and in 1824 Lieutenant-Colonel. In the last-mentioned year he was nominated by Sir Edward Paget to command the Bengal Artillery attached to the force under Sir Archibald Campbell, and served with great distinction in this capacity throughout the Burmese campaign. From this time his reputation was established as one of the best officers in the service.

It was in the memorable Afghanistan campaign of 1841, how-

ever, that our deceased Associate, now Major-General, came most prominently into public notice. Invested with the command of the forces west of the Indus, his task was to force the Khyber Pass and relieve Sir Robert Sale and his beleaguered army in Jellalabad. The way in which he accomplished this great feat of arms, deemed by so many authorities at the time all but impossible, is a matter of history too well known to need repetition here. For this service he was rewarded by being nominated Knight Grand Cross of the Order of the Bath, and by a formal vote of thanks from both Houses of Parliament, besides a pension of 1000*l.* by the Board of Directors of the East India Company.

On his return to England he was appointed by the Crown one of the Directors of the East India Company. He was also decorated with the Knighthood of the Star of India, and on the death, in 1871, of Sir John Burgoyne, received the appointment of Constable of the Tower of London. Thus honoured and respected, the last years of his long life were spent in well-earned repose. He died on the 6th of October last, and was buried in Westminster Abbey.

GENERAL CHARLES RICHARD FOX was the son of the third Lord Holland, and grand-nephew of the celebrated statesman Charles James Fox. He was born in 1796, and entered the Navy in 1809, in which profession he served till 1813, having been present at the siege of Cadiz in 1810 and that of Tarragona in 1813. In June 1815 he entered the Army as Ensign in the 85th Foot, and between that date and 1865 he passed through the various grades of rank to that of General, which he attained in September of the latter-mentioned year. In 1824 he served at the Cape of Good Hope, during which time he made a tour into Caffre Land, of which he has left in MS. a detailed and interesting narrative in which he describes his interview with the celebrated chief "Gaika." In June 1824 he married Mary Fitz-Clarence, second daughter of the Duke of Clarence (who was raised to the rank of a Marquis's daughter in May 1831).

Lady Mary Fox died in 1864; and General Fox subsequently married Katherine, second daughter of the late Mr. John Maberley, M.P. He died in April of this year, at the age of 76, after a tedious and protracted illness.

Our deceased associate was one of the original members of the Society, and always took an interest in its proceedings. He served on the Council in the years 1836-8, and again in 1860-1, and 1864.

He may be said from his earliest years to have been an active and enterprising traveller. In his childhood and youth he accompanied his father and mother in tours through Spain, Portugal, France, Switzerland, and Italy; from 1818 to 1820 he was in the Levant; in 1832 at the Cape of Good Hope,

Between 1822 and 1830 he visited Malta, France, Holland, Belgium, the Rhine, and Nova Scotia. Between 1830 and 1860 he was constantly travelling in Europe; and in 1865 he went once more to the East, visiting Smyrna, Cyprus, and Syria.

He was, as all travellers should be, an industrious taker of notes, and his long series of private journals, commencing in 1802, when he first travelled in Spain (being then only six years old), and continuing from that date with hardly a break through every year of the present century up to 1872, show with what diligence and intelligence he took advantage of every opportunity to gather information about foreign countries.

The journals kept during his tours in Greece and Asia Minor, and at the Cape, are particularly interesting read at this distance of time; and throughout these diaries many facts and observations are noted which are now much more valuable than the writer believed them to be at the time.

The same remarks may be applied to those parts of his journals which relate to his home life. He had from his youth great social advantages, and he turned these advantages to good account. At Holland House, in his father's lifetime, was to be found a gathering of men distinguished in politics, literature, and wit, such as it would have been difficult to meet with elsewhere in London; and his constant contact with this intellectual and refined society has enriched his journals with many curious anecdotes and remarks.

General Fox was well known to numismatists as a collector of Greek coins. His cabinet contains a most choice and rare collection in the arrangement of which he has shown the same patient diligence and love of recording facts which distinguish his journals. Though the collection consists of many thousands of pieces, the history and provenance of each coin is noted wherever it could be ascertained; a practice which, if it were more generally followed by collectors, would greatly lead to the advancement of numismatic science.

In 1856 General Fox published engravings of unedited or rare Greek coins in his collection, Part 1; Part 2 of which followed in

1862. It is to be regretted that he did not continue this useful publication, the engravings in which are admirably executed.

Few of the Fellows of this Society were better known or more generally beloved and esteemed than General Fox; he was warm and constant in his friendship, full of charity and consideration for the failings and misfortunes of others, and ever ready with a kind word or deed to help those who seemed abandoned or forgotten by the busy world.

His conversation, full of quaint racy humour, and anecdotes drawn from the stores of his varied experience, had a peculiar charm from its freshness and vivacity, and still more from the thorough honesty and sincerity which marked every utterance of his mind. He had too real a conviction of the value and power of truth ever to stoop to dissimulation, and of him it might be truly said that his nature was incapable of guile.

Colonel William Henry Sykes.—This well-known Indian officer and public man, who died soon after our last anniversary, namely, on the 16th of June, 1872, had served on several occasions on the Council of our Society; first in 1851, and again in 1855 and in 1860–1. He also contributed a paper to our Journal, vol. viii. (1838), "On the Use of Common Thermometers in Measuring Heights," which was reprinted in 1854 as portion of the pamphlet 'Hints to Travellers,' which is compiled and edited by a Committee of our Council. The late Colonel Sykes was born in 1790; entering the Indian Army in 1804, he was engaged in active service through the years 1804 to 1818. After that, till he finally quitted India in 1831, he was employed as Statistical Reporter to the Government of Bombay. In 1840 he was elected to a seat at the Board of Directors of the East India Company. He represented Aberdeen in Parliament from 1857 to his death.

Sir Donald Friell McLeod, whose death by an accident at a railway station on the 28th of November last attracted so much public attention, was a well-known and much esteemed Indian statesman, having held, during the later years of his career in India, the post of Lieutenant-Governor of the Punjab. He was born in India in 1810, his father being the late General McLeod, of the Bengal Engineers, and his grandfather, Donald McLeod, a Scottish laird of Ross-shire. According to custom he was sent home to be educated, not, however, at so early an age as to prevent him from acquiring the rare accomplishment of speaking the native language with faultless idiom and pronunciation, a circumstance which had much to do with

his after success in dealing with British and native interests at critical periods of Indian history. He returned to India in 1826, and retired from service in 1870. So liberal had he been throughout life in his hospitality and in his donations to charitable objects that he had little beyond his pension when he finally settled in England. He married, in 1854, the daughter of Sir Robert Montgomery, but left no family. We had the honour to enrol him as one of our Associates soon after his return to England, in 1871, and he was a constant attendant at our evening meetings.

CAPTAIN H. B. LYNCH.—By the death of Captain Henry Blosse Lynch, of the late Indian Navy, Companion of the Bath and Knight of the Lion and Sun of the 1st class of Persia, Her Majesty's service loses a meritorious officer, and the Royal Geographical Society an old and distinguished member. He died at Paris, on the 14th of April last.

Of a good old Irish stock—the Lynches of Castle Carra, county Mayo—he succeeded to the family estate of Partry as the eldest surviving son of Major Henry Blosse Lynch, who served in the expedition to Holland and in the campaigns of the Peninsula, and who, at the storming of Ciudad Rodrigo, in command of the advanced guard of Pack's brigade, received honourable mention in the Wellington Despatches for having made all opposed to him prisoners. Other members of the family followed a similar career, and, though the services of the subject of our notice were on a different field, they were characterised by the same ardour and devotion.

He began his professional career at an early age, in 1823, when he was employed on the surveys of the Persian Gulf. Having classical tastes and a love for languages, neither the climate nor the confined space in the ill-conditioned ships of the day deterred him from applying closely to their study. Having obtained his commission as lieutenant, he was appointed Arabic and Persian interpreter to the squadron in the Persian Gulf, where (till 1832) he was greatly trusted in conducting affairs with the independent Arab chiefs, and in examining the means of communication between the Gulf and the countries on either hand, under orders from H.M.'s Envoy in Persia. Next he is to be traced as a passenger to Europe in the feat of crossing the Nubian Desert, on the northern limit of Abyssinia, to the Nile and Egypt, after a perilous shipwreck in the Red Sea. In 1834, nominated by the Crown as second in command in Chesney's Expedition to the Euphrates, and subsequently by

the Indian Government as chief of an armed flotilla on the rivers of Mesopotamia, we find him up to 1842 engaged in extending our geographical knowlege of the great rivers, and in successful efforts to promote postal and commercial intercourse between India and Europe by these routes. In 1842, in a time prolific of wars, he was charged with a command, off the Indus, to keep up communications with the army of General Sir Charles Napier in Scinde. From that period to 1851 his duties were of a civil nature as Assistant to the Commander-in-Chief of the Indian Navy, and for a term he officiated for that functionary during his absence in England; he was also a member of the Oriental Examination Committee of Bombay. War with Burmah, in 1851, saw him in command of a squadron of steam frigates in the Irrawady, engaged till 1853 in all the operations against the enemy. For these services he was created a Companion of the Bath at the close of the war. Retiring, after an active service in India of 30 years, he took up his residence in Paris, where his great personal influence and experience enabled him to render further good service in the negotiations conducted there for concluding a treaty of peace with Persia in 1857.

In speaking of his professional usefulness, Henry Blosse Lynch is justly characterised in Markham's 'Memoir on the Indian Surveys,' "as an excellent observer and daring explorer;" for of the same school of officers as Welsted, Ormsby, and Wybard, he personally traversed many of the wildest regions of Asia, as the phrase goes, "with his life constantly in his hand." He was even more gifted than them as a scholar and linguist, and in having those rare qualities of geniality, tact, and temper, which command the respect of the wildest, and win the less barbarous, Orientals. Geographical science, indeed, is indebted to such men as Lynch for its most useful data; for, both in his published official reports, and the 'Journal' of our Society, we find the maps and papers connected with his name conveying the soundest information. Happily, he lived to witness the extended commercial intercourse between Mesopotamia and the adjoining countries, with Europe on the one hand and with India on the other, which he had striven so well to initiate. As a Fellow of our Society of 36 years' standing, the absence of his well-known face will leave a void amongst us not readily refilled. Of the gap beyond, in the circle of his immediate relations and friends, it is hard to speak. Our deepest sympathy, however, is with them.

CHARLES WHITE.—The late Mr. Charles White, Justice of the

Peace for the county of Middlesex and city of Westminster, was for many years one of the most regular attendants at our evening meetings. He took an active interest in the Society's affairs, especially in all that related to financial transactions and social gatherings, and his genial character endeared him to a large circle of friends. He served for three years on the Council of the Society, and fulfilled, with much assiduity, his duties as member of the Financial Committee, which holds monthly meetings throughout the year, and entails no little labour on the gentlemen who compose it. In the prolonged negotiations connected with the purchase of the freehold house we now occupy, he took much interest. He took a pleasure, in the later years of his long and honourable life, in the promotion of works of benevolence and utility, and in associating with those who were engaged in scientific pursuits. As a magistrate he was held in so much respect by those who had the best opportunity of judging, that the Assistant Judge at the Middlesex Sessions, Sir W. H. Bodkin, addressed the Court, after the Grand Jury had been charged, on the subject of the loss the Bench had sustained by his decease, speaking in high terms of his good sense, judicial merits, and humanity.

He died on the 18th of February, at the ripe old age of eighty years.

R. W. KEATE.—His Excellency Robert W. Keate, Governor-in-Chief of the West African Settlements, died at Cape Coast Castle on the 17th March, in his 59th year. The position of affairs at the Gold Coast called Mr. Keate to that place, immediately on his arrival in West Africa to assume the government, and he succumbed, after three days' illness, to the local fever.

Mr. Keate, who was born in 1814, was the second son of the late Mr. R. Keate, Serjeant-Surgeon to Her Majesty, and Inspector-General of Army Hospitals. He was educated at Eton and at Christchurch, Oxford. He was called to the Bar in 1844, appointed Civil Commissioner to the Seychelles Islands in 1849, Lieutenant-Governor of Grenada 1853, Governor and Commander-in-Chief of Trinidad 1856, Governor of Natal 1867, and Governor-in-Chief of the West African Settlements 1872.

He married in 1860 Henrietta Jemima, fourth daughter of Dr. Murray, of Woodbrook, Trinidad, and leaves issue two sons and two daughters.

Mr. NATHANIEL BEARDMORE, member of the Institute of Civil Engineers, was born at Nottingham in 1816. From his earliest youth he evinced a taste for engineering. He served his articles

for five years to the late Mr. J. M. Rendel, whom he left in 1839, and commenced business for himself. Soon after, however, he became Mr. Rendel's partner, with whom he worked for some years. In 1846-48 he took an active part with Mr. Rendel and others in the construction of the Edinburgh Water-works, and was connected with the supply of water to many of the large towns in the North of England.

Hydrological questions were his speciality, and he has given to the world, as the result of many years of careful study and laborious research, his well-known book the 'Manual of Hydrology.' This work, in addition to some purely technical tables, which were originally published in 1850 as a separate volume, entitled 'Hydraulic Tables,' contains much valuable and admirably condensed information on the subject of tides, rainfall, and evaporation, with a description of many well-known rivers. This part of the book is illustrated with plans and sections of the rivers Thames, Avon, Severn, Po, Adige, Reno, Seine, Tiber, Nile, Hooghly, and Ganges.

By careful reading and the observations he obtained of the rainfall in mountainous districts, and the flow of rivers in almost every part of the world, he acquired a surprising knowledge of different countries; and from his conversation he was often supposed to be a great traveller. It is related that once, when at dinner, the conversation relating to the Himalaya, an old Indian officer who was very familiar with that part of the country turned to him and said, "Then you also have been there."

For upwards of twenty years Mr. Beardmore was engineer to the River Lee, in Hertfordshire; the new works under the Act of 1851 were carried out according to his plans and designs, and he vastly improved the navigation. He was much engaged on the River Thames, having, since the passing of the Thames Navigation Act of 1866, acted as consulting engineer to the Conservancy Board.

His opinion was much sought for on water questions abroad as well as at home. His sound judgment and clear head rendered him able in reporting on hydraulic questions, and in giving evidence, which he frequently did in arbitration cases and trials at law.

He reported on various extensive works to the Public Works Loan Commissioners, and gave important evidence before the Royal Commissioners appointed to inquire into the water supply to London and other large towns, and also before that appointed to investigate the best means for preventing the pollution of rivers.

He had enjoyed comparatively good health up to about two years

before his death, but then the continual strain of mental exertion began to tell upon the physical frame, and he died on August 24th, 1872, in the 57th year of his age, after an attack of congestion of the lungs, from which he had not strength to rally in his then enfeebled state of health.

He was high-minded, generous, and unselfish. In his professional career his activity was remarkable, and his life was one of eminent industry and usefulness. He took a high standing among his brother engineers. Possessed of an enthusiastic love for his profession, of an untiring zeal and perseverance, together with genuine goodness and friendly sympathy, he has left a large circle of friends to mourn his loss.

Our losses by death during the year include also the following gentlemen:—Mr. T. Graves Archer, Mr. T. R. Auld, Mr. J. E. Anderdon, Sir David Baxter, Bart., Viscount Boyne, Mr. J. Brenchley, Mr. J. P. Brown, Mr. G. F. Chambers, Mr. J. Chapman, Sir W. N. Clavering, Bart., Mr. J. Cubitt, Mr. A. Grant, Admiral the Hon. J. Gordon, Mr. T. Gillespy, Mr. R. W. Grenfell, Mr. J. A. Guthrie, Mr. J. Hollingsworth, Mr. W. S. Hale, Mr. Charles Horne (a retired member of the Indian Civil Service, who had attracted some notice by his writings on Natural History), Dr. W. C. Hood, Mr. J. Hunt, Mr. T. Lee, Major-General Sir E. Macarthur, Major W. Montagu, Mr. W. Morgan, Major-General L. S. O'Connor, Mr. J. Power, Mr. F. Pike, Mr. A. S. Petrie, Mr. J. E. C. Pryce, Rev. T. O. Short, the Hon. Edward Stirling, Mr. H. Sterry, Mr. John Walker (cartographer to the India Office, and in 1852–3 member of our Council), Captain J. Walmsley, Captain W. M. Wolfe, Captain Sir W. H. Walker, Mr. James Walker, Mr. H. C. Walton.'

Admiralty Surveys.*

The following is a brief account of the surveying operations which have been carried out by the Admiralty during the past year.

On the East Coast of England.—The *Porcupine*, under Staff-Commander John Parsons, has been employed chiefly on the Essex and Suffolk coasts. A complete re-survey of the port of Harwich has been made, rendered necessary by considerable changes in the depths, produced both by natural and artificial

* By Admiral G. H. Richards, Hydrographer to the Admiralty.

causes. In the neighbourhood of Yarmouth and Lowestoft, where changes are constantly in progress, fresh surveys have been made; some of the banks were found to have moved materially to the southward, and what had until lately been a principal channel was closed up to navigation.

The survey was then carried south between Orfordness and the Naze, and is now in progress.

West Coast of England.—The *Lightning*, which had been for some years employed on surveying service, was found no longer seaworthy, and broken up; no vessel being yet available to take her place, the surveying party, under Staff-Commander J. H. Kerr, have been during the past year employed with boats in making a re-survey of Menai Straits and the neighbouring shores of Carnarvonshire, where considerable changes were found to have taken place since the last survey made in 1837.

Portsmouth.—This survey, which is principally connected with the deepening of the entrance to Portsmouth Harbour and with the examination of Spithead and the banks of the Solent, continues to be carried on in a steam launch by a small party under the direction of Staff-Commander D. Hall, and much accurate and useful work has been completed during the last season, including a re-survey of the harbour of Portland on a large scale, and an examination of Southampton Water.

Mediterranean.—This survey is still carried on in H.M.S. *Shearwater*. It was stated in the last report that, by dint of great exertions on the part of Captain Nares and his officers, an elaborate survey had been completed of the Gulf of Suez and a portion of the Red Sea. This work has lately been published by the Admiralty. The re-survey of Port Said and its approaches was also completed by Captain Nares during the past year. This officer having been appointed to the *Challenger*, was superseded, in April of last year, by Commander Wharton, who is now conducting the survey. In June last he left Malta to complete the examination of the Dardanelles, which, together with the narrow western portion of the Sea of Marmora for 25 miles eastward of Gallipoli, was finished by the end of October. During this survey some very complete and interesting experiments were made on the currents both in the Dardanelles and Bosphorus, which proved the existence of strong under-currents running counter to the almost invariable surface set from the Black Sea through both these straits into the Mediterranean. The details of these experiments, with illustrations, are in course of publication

by the Admiralty. A survey was next made of the roadstead of Dédé Agatch, the terminus of the railway from Adrianople.

In January the *Shearwater* visited Cape Bon, on the coast of Tunis, to select the site of a new light-house, which has long been required there, and for which the British Government are supplying the lighting apparatus; subsequently she resumed the survey of the coast of Sicily, and is now about to proceed on a re-examination of Port Said and its approaches.

Japan.—The *Sylvia*, Commander St. John, has been actively employed on the examination of these coasts during the past year. The season commenced with a survey of Goza Harbour, Muro Bay, and the coast and off-lying dangers in the neighbourhood of Cape Sima, on the east side of Nipon; subsequently Susaki and Nomi harbours, on the south coast of Sikok, were surveyed; these ports afford good shelter and serve as harbours of refuge for vessels when caught off the coast in heavy weather. The Baunga channel has been partially sounded, the anchorage off the island of Uimi Sima and the adjacent coast examined, and the eastern part of the Strait of Simonoseki re-sounded. In the latter part of August the *Sylvia*, having been several years in Japan, and requiring repairs and new boilers, was ordered to England. On her voyage she carried a line of deep soundings for telegraphic purposes from the entrance of the Gulf of Aden to the Seychelles, thence to Mauritius and Natal on the eastern coast of Africa, the depth of water on these lines varying from 2200 to 2500 fathoms. The ship arrived in England in April, and was put out of commission after one of the most successful surveying voyages on record. She will be thoroughly refitted, and it is hoped, at no distant date, will resume her labours in Japan.

The Eastern Archipelago.—The *Nassau*, Commander Chimmo, has likewise just returned after an absence of something under three years; she had been employed during 1872 principally among the Sulu Archipelago, and in clearing away the dangers of the Sulu Sea. Many difficulties were met with which impeded the progress of this work, among them the hostility of the piratical tribes which infest these regions, and which obliged the parties to be always armed and on the look-out; on a late occasion one of the boats was attacked, and some of the officers and crew wounded, in return for which their town was destroyed and severe punishment inflicted upon the pirates. The *Nassau* returned to Singapore by the Flores and Java seas, examining the various dangers in the track of

vessels by that route to Australia; she reached Malta by the Suez Canal in March, when she was put out of commission and is now being prepared for further surveying service on the eastern coast of Africa.

Cape of Good Hope.—This survey has been completed as far as circumstances will admit; the soundings which are still required to render it perfect will be obtained as opportunities offer. Navigating-Lieutenant Archdeacon and his assistant have been transferred to Western Australia, the survey of which has been commenced.

West Indies.—During the season of 1872, Staff-Commander George Stanley and his two assistants, with a hired schooner, have completed the survey of the Island of Dominica, and carried the soundings beyond the 100-fathom line. During September the Windward Islands were visited by a severe storm, when every vessel lying in the roadstead of Dominica, including the surveying schooner, was driven ashore. The latter was totally wrecked and several lives lost. The surveying party have proceeded with another vessel to Jamaica, which important island has long required a thoroughly good survey, and which it is hoped will now be carried out to its completion.

Newfoundland.—Navigating-Lieutenant Maxwell, who is in charge of this survey, has with his two assistants in a small hired steamer, completed the examination of Trinity Bay, and has commenced that of the south coast of the colony at the Burgeo Islands, completing the coast for a considerable distance to the eastward. Soundings have also been obtained in the neighbourhood of Sable Island. The accurate survey of the south coast of Newfoundland, indicating as it does the safe approach to the several harbours of refuge, is of great importance to the increasing trade with the river St. Lawrence.

Queensland.—Staff-Commander Bedwell, with one assistant, has during the past year made a minute examination of the Brisbane River, and has also examined the Bar at Wide Bay. The survey of the coast has been extended 50 miles to the north, from Keppel Islands to Cape Clinton.

New South Wales.—The survey of the inner waters of this colony are still in progress by Navigating-Lieutenant Gowland, at the expense of the Colonial Government. During the past season the inner waters of Broken Bay and the course of the Hawkesbury River have been surveyed as far as the flow of the tide.

Victoria.—The surveying party on this coast, under the direction

of Navigating-Lieutenant H. J. Stanley, have been employed during 1872 in completing the sounding of the western coast of the colony, and in the survey of King Island, at the western entrance of Bass Strait; about 120 miles of exposed coast has been examined, and a large area sounded over.

South Australia.—The surveying party in this colony, under the direction of Staff-Commander Howard, were employed during the early part of the last season on the west side of Spencer Gulf; Port Lincoln in the south-west corner of the gulf was surveyed, and the work carried northward to Franklin Harbour, where it joined the survey of 1871. The whole of this extensive gulf is, therefore, now completed. During the latter part of the year, the southern coasts of Kangaroo Island were examined, and the circuit of the island completed.

The extent of coast line examined during the year has been over 200 miles, all of which has been carefully sounded.

Western Australia.—The survey of this colony may be said to have barely commenced, and the difficulty of procuring a suitable vessel in which to prosecute it, will probably for some time render its progress slow.

Navigating-Lieutenant Archdeacon, the officer in charge, reached Fremantle in August last, and at the termination of the boisterous winter season lost no time in commencing the examination of the various passages between the islands and the reefs off the Swan River, in the absence of a vessel, working with boats, the first object being to ascertain whether that spacious sheet of water, known as Cockburn Sound, can be made available for navigation by large vessels.

Deep-Sea Exploring Expedition.—In the last notice of the Hydrographical Surveys it was announced to be the intention of the Admiralty, on the recommendation of the President and Council of the Royal Society, to despatch an expedition for the exploration of the Great Ocean Basins, and for scientific research and discovery generally. This intention has now been realised, and in December last H.M.S. *Challenger*, a frigate-built ship of about 1500 tons, sailed from England under the command of Captain G. S. Nares. In addition to a staff of naval surveyors, there has been attached to her a body of scientific naturalists, under the direction of Professor Wyville Thomson, F.R.S. The ship has been admirably equipped, and no expense has been spared to render her in every respect perfect; she has been abundantly supplied with all the scientific

instruments and apparatus necessary to carry out the physical investigation of the deep sea, and for the collection and preservation of natural history specimens, and fitted with all the mechanical appliances which modern science could suggest, in order to sound and dredge, and obtain temperature and other observations at the greatest depths. On leaving England the *Challenger* proceeded to Lisbon, Gibraltar, Madeira, Teneriffe; thence across the Atlantic to the West Indies, and by the latest accounts had reached Bermuda. Continuous lines of deep soundings and temperature observations had been carried throughout this track, and many interesting discoveries have been made in several branches of natural history. The deepest sounding obtained between the Canary Islands and St. Thomas's in the West Indies was 3150 fathoms.

After exploring the region around Bermuda, the ship will recross the Atlantic to the neighbourhood of Ayres, thence sail southerly to the Cape de Verde, subsequently traversing the equatorial region to Brazil, and the whole of the present year will be passed in the South Atlantic. Departing from the Cape of Good Hope early in 1874, she will visit Kerguelen Island, penetrate to the icy barrier in the south, thence to Australia and New Zealand; Torres Straits, the Malayan Archipelago, the Philippine Islands, and Japan will be successively visited, and the neighbouring seas explored; the Pacific Ocean will then be traversed, and the ship will return to this country, after a voyage of circumnavigation probably extending over three years. Such is briefly the programme laid down, and up to the present time all has gone prosperously and successfully with the *Challenger*. A brief and popular journal of the proceedings of the voyage will be published from time to time by Professor Wyville Thomson in the pages of 'Nature,' as a prelude to the full scientific account of the expedition, which will no doubt appear shortly after its termination.

General Remarks.—In addition to the Hydrographical Surveys which have been executed during the past year by the regular surveying service, a considerable quantity of valuable information has been received from the officers of H.M. ships employed on foreign stations and from others.

It would be difficult to mention every source from which such information has been received, but among the most prominent contributors are Captains John Moresby and C. H. Simpson of H.M. ships *Basilisk* and *Blanche*, and Messrs. T. L. Mourilyan and W. F. A. Grant, Navigating Officers of those ships, also S. T. Leckie, R.N.R.,

commanding one of the Pacific Steam Navigation Company's steamships. The *Blanche* made, in 1872, a six months' cruise among the South Sea Islands, during which time she visited the principal islands in the Caroline, Marshall, Gilbert, and Solomon groups, as well as New Ireland and New Hanover, describing and making plans of several unknown anchorages, these, as well as the nautical remarks accompanying them in reference to these little known regions, have been published for the benefit of seamen.

The *Basilisk* also visited the Ellice Islands, Santa Cruz, and New Hebrides groups, and several detached islands in the western part of the South Pacific, when every opportunity was taken advantage of in collecting useful information, and in making such surveys as the hurried nature of her visits would permit. On other occasions, while visiting the settlement of Somerset, at Cape York, Captain Moresby and his navigating officers have lost no opportunity of adding to and correcting the charts where imperfect. The *Barossa*, Captain Lewis Moore, likewise visited the Marshall and Gilbert Islands recently, in search of a shipwrecked crew, and some useful information has been received from Navigating Lieutenant Fenn, of that vessel.

Mr. Leckie, of the Royal Naval Reserve, has long been a valuable contributor to the Hydrographical Department, and has made many essential corrections to the charts, especially to those of the western portions of the Straits of Magellan and the channels leading northward into the Gulf of Pesias; for the great pains he has been at in all his voyages to collect and communicate useful information, his name deserves special mention in this report.

Summary.—The usual Tables of Tides, Lights, and Hydrographical Notices, &c., have been published during the year, as well as the following nautical works, viz., new editions of Sailing Directions for the West Coast of Africa, from Cape Spartel to the River Cameroons, including the Cape Verde Islands, Canaries, and Azores. Directions for the North Sea; a new volume, part 4, for the Northern Coast of China, Corea, Tartary, and Japan; a revision of the Directions for the West Coasts of France, Spain, and Portugal; and a volume of hydrographical remarks, relative to the islands of the Pacific.

Among the 73 new charts which have been engraved and published since the last yearly report, may be specially mentioned a Physical Atlas, showing the Winds, Currents, and other pheno-

mena prevailing in the Pacific, Atlantic, and Indian Oceans, during the different seasons; a chart of the Gulf of Suez; a new series of the Red Sea, in 5 sheets; New Caledonia, in 2 sheets; the Island of Barbados; and a sheet of the Inland Sea of Japan.

More than 1400 sheets have been added to or corrected, and the number of charts printed for the navy and the public during the period has been 158,700.

NEW PUBLICATIONS.—*Petermann's 'Geographische Mittheilungen.'*—The chief feature of the year in this important geographical Journal are the Arctic papers contributed by its editor. They contain the most minute and faithful records of the gradual advance of knowledge from all sides, and from all nationalities, in Arctic Geography.

Most interesting, perhaps, at the present time among the Asiatic papers are those which deal with the ourneys of Russian travellers in Eastern and Central Asia. Thus, we have an account of Prjivalsky's travels from Pekin towards the Koko Nor, in Western China; Matusovski's and Palinow's, in Central Mongolia; and of Fedchenko's journey through the Khanate of Kokan to Karategin and the Northern Pamir. The present state of our knowledge of the most northern portion of the Asiatic continent, extending into the Arctic seas between the rivers Lena and Yenisei, and near which the Austrian Polar Expedition of 1872 is believed to have wintered, has been placed in the clearest light by an essay describing and critically examining the results of every journey which has yet been made in the vicinity of the North Cape.

The *Mittheilungen* has also kept us fully alive to the movements of travellers and explorers in all parts of Africa, containing intelligence from Munzinger, in Northern Abyssinia; Ernest Marno, on the Upper Nile; Dr. Schweinfurth, in the basin of the Bahr-el-Ghazal; Dr. Nachtigal, in the countries of Soudan, round Lake Chad; Mauch and others, to the south of the Zambezi; and Hugo Hahn, in Damara Land; whilst the papers by Dr. Behm, which treated of the results of Dr. Livingstone's recent work on the Lualaba, supposed to be the Upper Congo, have been considered so important as to require translation for our own Journal.

In Australia, Gilmore's journeys in search of the remains of the Leichhardt Expedition, which are here carefully recorded and mapped, have done much both to elucidate the movements of that unfortunate traveller and to add to our knowledge of the region which lies westward of the great central line of telegraph.

Professor Mohn, the Director of the Norwegian Meteorological Institute, has contributed a most instructive essay on the results of all the observations for temperature in the deep seas between Greenland, Northern Europe, and Spitzbergen.

M. Emil von Sydow has also continued his admirable descriptions of the progress of European surveys and cartography; this series of papers is of the highest value to the practical geographer, and examples are not wanting of the beneficial effect which the criticisms they contain have exercised on the more recent sheets of the greater and topographical surveys now in progress.

Bruhn's 'Life of Humboldt.'—The scientific biography of Humboldt, the great father of Physical Geography, which has recently been completed, after three years of labour, under the editorship of Professor Bruhns, of Leipzig, demands cordial welcome at our hands. The work was undertaken in the year of the centenary of Humboldt's birth, and the various parts of it which treat of Humboldt's personal life, his travels in America and Asia, and of the varied contributions to many branches of science, have been written by the men best qualified in Germany to deal with each subject; the whole forms the most fitting tribute to the memory of the great philosopher.

Ocean Highways.—This publication has amply fulfilled the promise to which I referred in my last Address, of becoming, under its new editorship, an important Geographical Journal. Since then, articles of great value have appeared in the successive monthly parts, together with numerous original maps—all, as a general rule, referring to geographical subjects of great public interest at the time. Thus, during the summer months of last year, while public attention was powerfully drawn to the subject of Dr. Livingstone's discoveries in Central Africa and to the remarkable exploit of Mr. Stanley, there appeared a valuable sketch-map by Keith Johnston, giving the positions of places mentioned by Livingstone and his routes; and several editorial articles written with great spirit and knowledge of the subject. A map by Ravenstein, delineating the routes and discoveries of Schweinfurth, was also a meritorious and timely publication. There have also appeared several important maps on the countries of Central Asia, translated and popularised from Russian authorities. Such are the map of the country between Krasnovodsk and Khiva from Skobolef; that of the region between the Caspian and the Oxus; and that of Central Asia, which appeared in the August number. Amongst the numerous articles containing valuable geographical information, I may men-

tion also those on Arctic subjects; some of which are illustrated by valuable maps: Grandy's paper on the Congo, with map, in the January number; and Dr. Brandis' article on the distribution of Forests in India, also with a map, in the number for August. Besides these chief contributions, each monthly part contains reviews of books on Geography and Travels, *résumés* of the doings of Geographical Societies at home and abroad, and a great variety of miscellaneous information bearing upon geographical subjects.

Guido Cora's 'Cosmos.'—A new Geographical Magazine, under the title of 'Cosmos,' has been started at Turin by Signor Guido Cora. The first and second parts contain articles on the recent Italian Expedition to New Guinea of Beccari and D'Albertis; on Lake Tanganyika (a useful *résumé* by the editor, with a map, of the various explorations in the basin of this famous African lake); on Russian Possessions in Central and Northern Asia, by Luigi Hugues; on Giles' Journey in Central Australia (with a map) and the Continental Australian Telegraph (also with map), and on the Colonisation of the Island of Yesso (with map). Besides these, each part contains a large number of minor notices. A periodical of this character, so fully up to the mark in these rapidly progressing times, is an encouraging symptom of healthy intellectual life in Italy. The maps at present are only copies or adaptations of others published in England and Germany; but they are favourable specimens of cartographic art, and, together with the copious information given in the text of the progress of Geography in all parts of the world, place in the hands of Italian readers the means of acquiring a knowledge of all that is passing in this department of human activity.

Bollettino della Società geografica italiana.—The eighth volume of the 'Bulletin of the Italian Geographical Society' was published in October, and is the last that has reached us. From the *Compte rendu* of the administrative proceedings of this Society, of the 4th June, 1872, we learn that the distinguished geographer and founder of the Society, the Commendatore Cristoforo Negri, had been replaced in the Presidency by the Commendatore Correnti, and had been invested with the title of Honorary President, with the functions attached to that post of conducting the foreign correspondence. The eighth volume of the 'Bollettino' contains several original memoirs by Italian travellers and writers, besides correspondence and minor notices relating to almost all subjects of current interest in Geography and the allied sciences.

Voyage d'Exploration en Indo-Chine.—Lieutenant Francis Garnier, of the French navy, to whom we gave our Patron's Medal in 1870 for the part he took in the Expedition under Lagrée through Cambodia and Yunnan to the Yang-tsze, has now given to the world the complete narrative of this important journey. As will be remembered, Lieutenant Garnier succeeded to the command on the death of his chief, whom he left in the capital of Yunnan whilst he himself undertook a perilous journey to the head-quarters of the Mahommedan rebels at Tali-fu. The work he has now published is in every way worthy of the splendid undertaking the results of which it is intended to record. It consists of two large quarto volumes of text, illustrated with many hundred wood engravings from drawings made by members of the expedition. Besides these there are two atlases in large folio, one containing 22 sheets of maps and plans, and the other 47 plates, lithographed from drawings made by Lieutenant Delaporte. Some of the plates are coloured, and those especially which depict the colossal ruins of the Cambodian temples of Nakon Vat and Ongcor Vat are very striking. Before the expedition started on its long journey up the Mekong, Captain Lagrée devoted much time to the study of these marvellous ruins. Our library is indebted for a copy of this fine work to Lieutenant Garnier and to the Ministre de la Marine.

Switzerland.—Our much esteemed Corresponding Member, M. J. M. Ziegler, with his usual punctuality, has furnished us with a Report of the Progress of Geography in Switzerland. According to his account the subject most worthy of mention, as in former years, is the continuance of the "Nivellement de Précision," and he furnishes us with a copy of the Proceedings of the 11th sitting of the Swiss Geodetic Commission, which has this work in its charge. The eminent surveyors and physicists, MM. Plantamour, Denzler, and Hirsch, who constituted the Commission at this sitting, have not yet, according to our correspondent, arrived at definite results; but they have satisfactorily determined two points of direct communication with the German levelling—one at Bâle and the other at Constance. The aim of Swiss surveyors has been for several years the attainment of the utmost possible precision in all that relates to the topography of their rugged country, both in its horizontal and its vertical configuration. M. Ziegler himself has contributed in no small degree to this result, by devoting eight years

to the task of fixing the altitudes of the granitic masses forming the eastern pendent to Mont Blanc; the list of which he communicates, and which is well worthy of a place in our 'Proceedings.'

Another of our Swiss Honorary Correspondents, Professor Paul Chaix, has sent us a copy of the General Table of Limnimetric and Meteorological Stations for Switzerland for 1871, and has pointed out in a valuable letter, forwarded at the same time, a few general facts suggested by the results. These comprehend a grouping of districts according to the amount of the yearly rainfall, and a hydrometric summary of the different river-basins and lakes, showing with accuracy the regulating influence of these latter on the drainage of the countries through which the rivers flow. The details are too lengthy to be here given, and will find their proper place in our 'Proceedings.'

ARCTIC EXPLORATION.—In my Address of last year I announced the despatch of the Swedish Arctic Expedition, with the intention of wintering in Mossel Bay, on the north side of Spitzbergen, and of exploring by means of sledge-parties during the spring of the present year. The expedition consisted of the *Polhem* steamer (commanded by Lieutenant Palander, with Professor Nordenskiold on board), which was to winter; and the brig *Gladan* and steamer *Onkel Adam*, intended to take out supplies and return before the winter set in. Unfortunately the two latter vessels were caught by the ice, and have been forced to winter off Spitzbergen, and it is feared that the necessity for supplying their crews will have the effect of crippling the resources of the *Polhem*. Nevertheless, we may entertain the hope that the gallant Swedes will persevere in their enterprise and do some useful geographical work during the present season. Four fishing vessels from Norway were also frozen in, and forced to winter off Grey Point, and eighteen men retreated to Ice Sound, on the south-west side of Spitzbergen in open boats. On hearing of these disasters the Norwegian Government immediately chartered the sealing steamer *Albert*, and despatched her, under the command of Captain Otto, with relief, including two wooden houses to be erected on shore for the men in Ice Sound. The *Albert* sailed in November, but was driven back by stormy weather. Then Captain John Kjelson, in the *Isbiorn*, made a gallant attempt to reach Spitzbergen in mid-winter. He sailed from Tromsö on the 24th December, but the extreme cold rendered navigation almost impossible. On the 8th of January the

Isbiorn sighted Bear Island. The vessel was one mass of ice, and this audacious effort to reach Spitzbergen in mid-winter was unwillingly relinquished. Thus the hardy Norwegian fishers, as well as the Swedish explorers, have been obliged to pass a Spitzbergen winter without being relieved. But the spring is now well advanced, and by this time succour must have reached these brave men from Norway.

The Norwegian sealing vessels made some very important discoveries to the eastward of Spitzbergen during July and August of 1872. Captain Altmann and Captain Johnsen, sailing in a north-easterly direction from the Rijk Ys Islands, re-discovered the extensive island which was first discovered by an English ship in 1617, and named Wiche's Land. Captain Nilsen, in the same season, rounded the eastern point of Wiche's Land, and sailed along its northern coast. This re-discovered land, with the tracks of the three Norwegian vessels, have been delineated on a chart by Professor Mohn, of Christiana, to whom geographers owe so much for his exertions in collecting and putting into shape the observations of his adventurous countrymen.

The Austrian Arctic Expedition, under the command of Captain Julius Payer, sailed in June 1872, with the object of rounding the north-eastern end of Novaya Zemlya, and pressing to the eastward through the Polar Sea to the north of Siberia. Captain Payer hopes to be able to explore this sea through the favourable operation of the warm Siberian rivers on the ice-cold Arctic Ocean. He is accompanied by his old comrade Lieutenant Weyprecht, and by the Norwegian explorer Carlsen, the only commander who has circumnavigated both Spitzbergen and Novaya Zemlya. Captain Payer intends to pass his first winter on the shores of Cape Chelyuskin, and if unable to reach Behring Straits in the second season he will abandon his steamer, the *Tegethoff*, and proceed up one of the Siberian rivers. The *Tegethoff* was accompanied as far Novaya Zemlya by Count Wilizec, in the little *Isbiorn*. The latest news of the *Tegethoff* was from the coast of Novaya Zemlya, when the *Isbiorn* parted company in August. The ability and high qualifications of Captain Payer, as well as his Arctic experience, give every reason for the hope that his efforts will be rewarded by success.

In my Address last year I mentioned the important voyage of Mr. Leigh Smith to the north and east of Spitzbergen, in the summer of 1871, when he reached a latitude of 81° 24′ N. In

1872 this adventurous yachtsman undertook another voyage in his yacht the *Sampson*, but it was an unfavourable season, and no discovery was made. Mr. Leigh Smith is a man who will not be daunted by one failure. He will persevere until a favourable season enables him to do really important work, and this year he has again sailed for Spitzbergen.

The captains of our English whalers, courageous and intelligent men, who yearly brave the dangers of ice navigation, are often led into unvisited regions in the pursuit of whales, and are thus in a position to record useful geographical discoveries, and to furnish the hydrographer with materials for adding to or correcting the Arctic charts. In the season of 1872, Captain Adams, of the *Arctic*, went up Pond's Inlet into Eclipse Sound, and thence, through Navy Board Inlet, into Barrow Strait. He also ascended Admiralty Inlet for a considerable distance, and his discoveries have been inserted on the latest edition of the chart. Captain Gray, of the *Eclipse*, who always goes to the sea on the eastern side of Greenland, reported the existence of an unusual extent of open water in the summer of 1872.

In my Address for 1871-72, I had the pleasure of announcing that the Arctic Committee appointed by our Council had drawn up a Report, which was adopted; and that the unanimity of all Arctic authorities on the route that should be taken by an exploring expedition in the unknown Polar region would enable me to bring the subject of Arctic exploration to the notice of other learned societies, and subsequently to that of the Government. The views of other scientific societies and of eminent men of science, as to the importance of Arctic exploration, coincided with those of our own Council, and I was thus in a position to bring the subject before Her Majesty's Government for favourable consideration. Accordingly, on the 16th of December I had an interview with the Chancellor of the Exchequer and the First Lord of the Admiralty, accompanied by a deputation, consisting of Sir Henry Holland, the President of the Royal Institution; Dr. Carpenter, the President of the British Association; Dr. Hooker, the future President of the Royal Society, and by several eminent Arctic officers. I submitted to the right honourable gentlemen the opinion of our Arctic Committee and the views expressed by several scientific societies with whom I had communicated; and I represented that the collective evidence of these seamen and men of science could leave no doubt with regard to the value and importance of the results which

a well-appointed Arctic expedition, in the direction of Smith Sound, must yield. I also alluded to the way in which Arctic exploration redounded to the national honour and repute; and contributed to keep alive that spirit of courage, enterprise, and self-denial which is so essential to the character of the seamen of a great maritime nation.

Both Mr. Goschen and Mr. Lowe made numerous inquiries respecting the equipment of an Arctic expedition and the scientific results to be attained by it, and, after a very favourable reception, Mr. Lowe concluded the interview by assuring the deputation that the subject should receive careful and mature consideration.

The reply from the Chancellor of the Exchequer, written December 31st, was not so favourable as had been anticipated, although it left room for hope that the Arctic expedition so ardently desired by this Society and the country generally would only be postponed for another year. Mr. Lowe said that there seemed to be no pressing necessity for despatching an expedition this year, and that it would not be right to send out a second scientific expedition precisely at the moment when the public revenue had to bear the burden of fitting out the *Challenger*. In conclusion, Mr. Lowe expressed regret that he could not recommend the sending a Government exploring party to the Arctic Ocean this year.

In my reply, acknowledging the receipt of this letter, dated the 13th of January, 1873, I said that the Council were glad to see that the Chancellor of the Exchequer did not express an opinion as to the expediency of sending an Arctic expedition at a future time; and that we were thus emboldened to hope that the additional arguments in favour of Arctic exploration with which we expect to be fortified, would lead to an expedition being sanctioned later in the present year, which might leave England for Smith Sound in the spring of 1874, and thus furnish a fitting and much needed complement to the scientific voyage of the *Challenger*. The Council of the Royal Society has since appointed a committee to confer with our own Arctic Committee, and steps will thus be taken once more to bring the subject of an Arctic expedition to the notice of the Government in a way which should lead to a satisfactory result. There seems to be good reason to hope that the year 1874 will see the despatch of an exploring expedition to the unknown and most interesting region which lies round our northern *pole, through the* portal of Smith Sound.

Meanwhile, the Arctic campaign of the present year may be expected to yield good fruit, in spite of the postponement of an English expedition. Payer and Weyprecht are wintering on the Siberian coast, and the Swedes in the north of Spitzbergen. Intelligence has also been received of Mr. Hall's American Arctic Expedition, from a portion of the crew, consisting of twelve men, two women, and five children, picked up in an open boat off the coast of Labrador, and brought into Roberts' Bay, Newfoundland. Their story is, that the *Polaris* went up Smith Sound, as far as 82° 16′, in the summer of 1871, that Mr. Hall made a sledge journey up a strait 15 miles wide, and that he died of apoplexy in November 1871. The command then devolved upon Captain Boddington, the sailing master; and, in August, 1872, the ship is stated to have been beset in 77° 35′, which would be near Whale Sound, in the northern port of Baffin's Bay. The men who have been picked up were carried away by the ice, according to their own statement; and they allege that the *Polaris* is left without boats, but with plenty of provisions. According to this account, Mr. Hall's expedition will have added little or nothing to the discoveries of Kane and Hayes, but it will be useful as furnishing another proof of the necessity for sending out a thoroughly-equipped Government expedition, if really important results are to be obtained from Arctic exploration. Mr. Leigh Smith has sailed again for his old Spitzbergen ground, resolved once more to strive for a passage through the ice, and to achieve some new discovery. In this, his third Arctic voyage, he is provided with a more suitable vessel. The *Diana* is a strong little screw-steamer, built and strengthened expressly for ice navigation, of 103 tons and 50-horse power. Mr. Leigh Smith has an experienced master in Captain Fairweather, and he is accompanied by Mr. Eaton as a naturalist. The yacht *Sampson* goes out as a tender to the *Diana*. The whaling fleet will also bring back valuable information respecting the state of the ice, and, perhaps, make some new discoveries. Captain A. H. Markham, R.N., has sailed with Captain Adams, on board the *Arctic*, for Baffin Bay; and on his return he will report to us the results of the voyage and his observations on the present state of the ice in the direction of the northern sounds. Thus many zealous explorers are now prosecuting researches within the Arctic Circle, and may be expected to furnish us with a large stock of fresh information next autumn, which will be useful to the Arctic Expedition of 1874.

Venetian Voyages to the North in the 14th Century:—The Lost

Greenland Colony—The pre-Columbian Discovery of America.—A paper of considerable importance to historical geography has been presented to the Society by Mr. Major, and will shortly be read at an evening meeting, in which he brings before the notice of the Society two geographical documents, one Venetian, the other Greenlandic, of the close of the fourteenth century. The authenticity of the former had been disputed for three hundred years, and, so late as 1836, had been declared in our own 'Journal' to be a tissue of fiction, by the Danish hydrographer Captain Zahrtmann, in an article so remarkable for its learning and ingenuity as to have carried with it *all but* the force of demonstration, but Mr. Major has answered all Captain Zahrtmann's arguments, and succeeded in establishing the truth of the documents from internal evidence.

The correctness of the second document had been impugned on a very vital point, but Mr. Major has been able, by means of an important geographical discovery of his own, to restore this valuable historical relic to its integrity, and from the evidence of the two documents combined to determine, beyond all dispute, the true site of the lost Greenland colony, and to show that at that period, which was a hundred years before the great voyage of Columbus across the Atlantic, there still existed remains of the ancient Scandinavian colonists in North America.

At the close of the 14th century a member of one of the most ancient and noble families in Venice, Nicolò Zeno, at his own expense, went on a voyage, rather of curiosity than discovery, into the Northern Seas. For two centuries before his time the Flanders voyage from Venice had been a matter of annual occurrence, but chance gave to this voyage a very peculiar interest. Nicolò Zeno was wrecked on the Feroe Islands, but fortunately fell in with Henry Sinclair, Earl of Orkney and Caithness, who was bent on increasing his possessions by naval conquests, and who took Zeno into his service as pilot of his fleet. After a year or two Nicolò Zeno sent a letter to his brother Antonio inviting him to join him, which he did, and it is from that letter of Nicolò's, and subsequent letters from Antonio to a third brother, Carlo (a very distinguished man in Venetian history), that the narrative of the movements of the two brothers is derived. They comprise, in the first instance, some insignificant expeditions in the Feroe and Shetland groups, but fortunately treat at greater length on two much more important subjects, viz., a visit by Nicolò Zeno to Greenland, disclosing some interesting facts which, brought into harmony with recent observations,

present a contemporaneous proof of the whereabouts of the lost colony of the Ostrebygd, about which there has been so much dispute, and to verify which the King of Denmark sent out Captain Graah on his famous voyage of 1828-30. In illustration of this portion of the subject, Mr. Major has adduced a highly important geographical discovery of his own, the ignorance of which led Captain Graah into great mistakes, and caused him to miss the value of a most precious early document which otherwise would have answered the question which he went out to Greenland for the purpose of solving. This was nothing less than a Chorography of the old Greenland colony and sailing directions for reaching it from Iceland, written by Ivar Bardsen, the steward of the bishop of the colony. In this route he speaks of some large rocks midway between Iceland and Greenland, called Gunnbjorns Skerries, which had formed a nucleus for the ice coming down from the north, and on reaching which a south-west course was to be taken. Captain Graah denied the existence of these rocks as thus described, and so forfeited the guidance of these valuable sailing directions. Mr. Major has discovered, by a legend in the 1507 edition of Ptolemy, that the island, of which these rocks form the summit, was blown up by a volcanic eruption in 1456; and in a map by Van Keulen, of about the date of 1700, the reef, 60 miles in length, formed thereby is laid down by the name of Gombar Scheer, with soundings at the north and south ends of 25 feet, whereas the nearest soundings northward range from 70 to 100 feet. Mr. Major further showed that Ivar Bardsen's Chorography had only to be read with common attention to indicate the site of the old colony beyond all dispute.

In the letters of Antonio Zeno are narrated the observations of some fishermen in North America in the last half of the fourteenth century. Their interest consists mainly in their antiquity and in their confirmation of those pre-Columbian discoveries of America by the Northmen which had been mentioned by Adam of Bremen in the 11th and Ordericus Vitalis in the 12th century, but on which so much light has been thrown in the present century by the Danish antiquary C. C. Rafn and others.

Antonio describes a voyage which he made with Sinclair and a large fleet to the west to verify the fishermen's story, and it has been thought by many, and amongst others by the great geographer Ortelius, that in this voyage the Venetians anticipated Columbus in the discovery of America. Mr. Major has shown, however, that this

was not the case; but that, being driven by a storm they knew not whither, they lighted on the coast of Kerry, were refused admission by the Irish, and were howled off the coast, which they followed all along the south and east side of the island, and which they quitted at its northern end, and finally made their way to Greenland. The whole story had been written out by Antonio Zeno; but a descendant of his, named Nicolò Zeno, born in 1515, when a boy, not knowing the value of these papers, tore them up, but, some of the letters surviving, he was able from them subsequently to compile the narrative as we now have it, and which was printed in Venice in 1558. There was found also in the palace an old map, rotten with age, illustrative of the voyages. Of this he made a copy, unluckily supplying from his own reading of the narrative what he thought was requisite for its illustration. By doing this in a blundering way, unaided by the geographical knowledge which enables us to see where he goes astray, he threw the whole of the geography which he derived from the narrative into the most lamentable confusion, while those parts of the map which are not thus sophisticated, and which are consequently original, present an accuracy far in advance by many generations of the geography even of Nicolò Zeno junior's time, and confirm in a notable manner the site of the old Greenland colony. In these facts we have not only the solution of all the discussions which have arisen on the subject, but the most indisputable proof of the authenticity of the narrative; for it is clear that Nicolò Zeno, junior, could not himself have been the ingenious concocter of a story the straightforward truth of which he could thus ignorantly distort upon the face of a map. I will conclude by observing that, if the realities which Mr. Major has detected had been made clear to people's minds, as they easily might have been, three hundred years ago, Martin Frobisher would have avoided the blunder of taking Greenland for Zeno's Frisland, which really meant the Feroe Islands: a host of learned commentators during that period would have been saved from confusing themselves and others by wild speculations: the site of the lost Greenland colony would have been established long ago on the highest possible authority, and the Kings of Denmark, from Frederic II. downwards, would have been spared the necessity of sending out a great number of unsuccessful expeditions, and the name of a noble gentleman of the highest rank in the Republic of Venice would have been protected from the unwarrantable and infamous charge of being guilty of falsehood and forgery.

UNITED STATES.—A convenient summary of the progress of geography and scientific exploration in the United States of America was given in the Annual Address of Mr. Chief Justice Daly, President of the American Geographical Society, in February last. We learn from this discourse that Professor Hayden, whose exploration of the wonderful district of the Upper Yellowstone I noticed at the last anniversary, has since been occupied in similar investigations in the territories of Utah, Idaho, and Montana, west of the Rocky Mountains. The exploration of the Yellowstone River district having excited so much public attention, a liberal grant was made by Congress in 1871-72 to continue the survey, and two parties (to each of which a geologist, a topographer, astronomer, and meteorologist were attached) were actively employed in the summer of 1872. One party, under Mr. James Stevenson, made a careful survey of the Teton Range, in Idaho. The second, under Professor Hayden, explored the valleys of the Yellowstone, Madison, and Gallatin, in the territory of Montana. The event of the season was the ascent of the Grand Teton, which proved to be 13,762 feet high, and therefore one of the loftiest peaks of North America. Four passes over the Rocky Mountains were surveyed, varying from 6443 to 7271 feet in elevation. The region explored is interesting as being the seat of the chief sources of the three great rivers of North America—the Missouri, the Columbia, and the Colorado. Astronomical observations were made by both parties for latitude and longitude at every available point, and materials obtained, for the first time, for a reliable map of this large extent of rugged country.

Besides his minor papers on the Yellowstone and other districts, Professor Hayden, as geologist to the territories of the United States, has published several larger and more elaborate reports on the surveys which he has carried out, all of which teem with information of great interest to the Physical Geographer. One of them relates to the geology of Wyoming, and another to Nebraska and adjacent territories; copies of which, together with an extensive series of photographs of large size, relating to the countries surveyed, have been presented to our library by the author.

In the Address of 1871, my predecessor, Sir Roderick Murchison, alluded in commendatory terms to the Topographical and Geological Survey of California, carried out under the direction of Professor J. D. Whitney. A series of handsomely illustrated quarto volumes had been issued by the State Government, giving the

results of the survey in various departments; but it is only recently that the elaborately-executed maps have been prepared for publication. We are indebted to Professor Whitney himself for early copies of some of the sheets, which are admirable specimens of cartographic art. I feel pleasure in adding that our Council last autumn elected this distinguished geologist and surveyor one of the Honorary Corresponding Members of the Society. We are informed by him that an important and long-desired reform has this year been brought about, at his instigation, in the management of the geographical exploration of the western portions of the United States. What was formerly the "Geological Survey of the Territories," under the direction of the Department of the Interior, is now the "Geological and Geographical Survey of the Territories." One of Professor Whitney's former assistants, Mr. Gardner, has been placed in charge of the topographical work, which will henceforward be systematically and skilfully prosecuted. The United States Coast Survey in future will have charge of the main triangulation of the interior and of the astronomical determinations of geographical positions. Geographical science will be greatly benefited by these new arrangements; for we must bear in mind that there has hitherto never been in the United States a systematic Government Survey like those of nearly all European countries, and that up to the present time cardinal questions in the geographical configuration of the North American continent—such, for instance, as the continuity or otherwise of the Rocky Mountain range with the Andes—have never been definitely settled.

Before quitting the subject of North America I must mention the exploration of the stupendous cañon or gorge through which the River Colorado flows in its course to the head of the Gulf of California. According to Dr. Bell, in his paper published in the 39th volume of our Journal, this grandest of all the cañons of North America, 500 miles in length and for long distances more than 2000 feet in depth, was first penetrated and traced by an adventurer named White, who embarked with a companion on the upper course of the river, and was carried by the rapid current for many days down the narrow and gloomy chasm. Since then Professor J. W. Powell, under the auspices of the Smithsonian Institution, has undertaken a survey of this wonderful gorge, and we are informed that his second report was published last year. He has successfully navigated the river more than once through the wonderful series of cañons at the bottom of which it flows, and has made interesting

geological observations throughout the region, which have a bearing on the discussion as to the origin of these deep and narrow furrows in the earth's surface; for example, he has found an extensive series of "faults" running northerly and southerly *across* the Grand Cañon, the fissures of which have been vents for volcanoes, and are from 50 to 200 miles in length; thus showing that these deep river-gorges do not coincide with faults in the strata.

Other explorations, of more or less interest to geographers, are being carried on in North America, to which my limited space will not permit me to give more than a passing allusion: such are the surveys in connection with the Northern Pacific Railroad, between Lake Superior and Puget Sound, entailing the examination of 3843 miles of country; Dall's exploration of the Aleutian Islands; and Captain Jones's surveys in the Uintah Mountains, a spur of the Wahsatch range.

CENTRAL AMERICA.—An important geographical and commercial undertaking, in which the Government of the United States has been engaged for three years past, is that of the thorough exploration of the Isthmus of Panama, with a view to setting finally at rest the vexed question as to the best and most practicable line for a ship-canal from the Atlantic to the Pacific. The officer entrusted with this arduous task was Commander Selfridge, of the United States Navy, supported by a staff of surveyors and well-equipped body of men. He commenced the work in the winter of 1870, and since then has successively examined the various routes which have been advocated by projectors. All were found totally impracticable, except the most southerly line, namely, that from the Pacific to the Atrato. A preliminary survey having led to favourable expectations regarding this line, Commander Selfridge was sent again at the close of last year to examine the country between Cupica Bay and the Atrato, where he expects to find a depression in the Cordillera. A canal at this point would, it is calculated, reduce the distance by sailing vessels, between New York and Hong Kong, from 110 to 83 days.

SOUTH AMERICA.—The magnificent cataract on the Potaro River, in British Guiana, called the Kaieteur Falls, the discovery of which by Mr. C. B. Brown I recorded in my last Address, has been re-visited by the Hon. H. S. Bascom, Major Webber, and Lieutenants Banfather and Jackson, of the 2nd West India Regiment. The

party took with them a professional photographer, and the result has been the publication of a handsome volume, from the pen of Colonel Webber, giving a narrative of the journey and description of the Falls, illustrated by a large number of exquisite photographs. The volume contains also much information regarding the geology of the districts visited; and geographers may congratulate themselves on having, at so short an interval after its discovery, the means of forming a fair idea of a region so marvellous in its physical configuration.

We have not received during the past year any further reports of the progress of exploration in the interior lands of Brazil, Peru, and the neighbouring States; survey work is, however, steadily advancing, at many points distant from each other. Thus we hear of progress being made in clearing and levelling the route for a line of railroad past the rapids and cataracts of the Madeira River, which I described in last year's Address, and which has for its object the establishment of water communication between the fertile provinces of Bolivia and Europe, *viâ* the Amazons. The Chilian Government, further south, is also continuing its work of surveying and mapping the southern parts of its territories. In the early part of 1872 Captain Vidal Gormaz, of the Chilian navy, was charged with the exploration of the Bay of Reloncavi, lying between the mainland and the island of Chiloe, his Report being published at Santiago early in the present year. During the progress of this survey, which was conducted with great care, a party of officers from the vessel, after exploring Lake Lanquihue, at the western foot of the Andes, ascended the extinct volcano Calbuco, and attempted also that of Osorno. We hope soon to obtain copies of Captain Gormaz' Report and the survey maps, for our Library and Map-Collection.

East of the Andes, in nearly the same parallels, a considerable addition has been made to our knowledge of the configuration of the mountain slopes by Mr. Crawford, the surveyor employed by the Buenos Ayres Government to explore a route for a line of railway, to cross the Pampas and the Planchon Pass over the Andes into Chili. The course of the Rio Grande, and of other streams flowing towards the Rio Negro, were for the first time accurately laid down, and a series of levels taken across the Andes. The Planchon Pass was found to be 8225 feet above the sea-level, and a practicable, though somewhat tortuous, line for a railway was found across it.

It is probable we may soon hear of another adventurous exploit of Commander Musters in this region, for, as I have recently been informed by his brother, Mr. J. C. Musters, he had completed his arrangements in March last for crossing the Andes from Valdivia to the head waters of the Rio Negro, where he expected to be well received by his former friends the Patagonians. He intended to proceed to Rio Bueno, and to cross the Andes by Lakes Ranco and Lacar. He had heard of a great gathering of Patagonian Indians on the eastern side, preparatory to a raid on a large scale on the Argentine settlements—a state of affairs which would seem not at all favourable to his enterprise.

Further north, in Paraguay, we learn that the Government is preparing a scientific commission to explore the mineral, botanical, and zoological productions of the country, and to report on its geography, climate, statistics, and so forth. The members of the Commission are to be chosen in Europe, and the Consul-General of the Republic, Professor Leone Levi, has done our Council the honour to invite them to recommend a qualified gentleman to serve as geographer and statician. In a country so favourably situated as Paraguay, reported on all sides to abound in natural wealth, but of which we know so little, an expedition of this kind could not fail to benefit the various branches of science.

AUSTRALIA.—The event, in this portion of the globe, most interesting to geographers is the completion of the Electric Telegraph across the Australian continent. The first message was transmitted by it to London in November last, just ten years after our late medallist, John MacDouall Stuart, returned to Adelaide from his wonderful journeys, which opened the way for this great international work. When the Royal Geographical Society awarded Stuart the Patron's Medal in 1861 (before he had completed his discoveries), Sir Roderick Murchison, on the occasion of its presentation, enthusiastically alluded to this prospective telegraph line, and said:—"When this telegraphic communication from south to north is opened out across Australia, may the first message transmitted be 'Honour to MacDouall Stuart.'" In his last Address he again alluded to it in connection with the approaching construction of a line of telegraph:—"It would have been a bold prophecy in 1861 that should have predicted so early an extension of this very line of communication." As is well known, the surveying parties of the telegraph expedition under Mr. Charles Todd were the imme-

diate successors in the footsteps of our medallist, for the line is carried directly over Stuart's route. His name, however, was lost sight of in the natural congratulations which hailed its completion.

This hand-rail across the continent must have a very important bearing on the question of the exploration of the western half of Australia, as each of the eleven intermediate telegraph stations on the long line will afford a point of departure or refuge for any expedition attempting it. Another point will be the gain to meteorology, as the daily weather reports, recorded at each of the thirteen stations on the 1973 miles of its meridional length, will hereafter afford a good insight into the peculiarities of the climate of the interior.

It is to be regretted that Mr. Forrest's proposal to the Western Australian Parliament in August last was postponed. Mr. Forrest has proved himself to be so able an explorer that complete success would almost certainly have attended his endeavour to solve the great problem of the nature of the country lying between the Murchison River on the west coast and the telegraphic line at the centre of the continent. The adventurous journey of this distinguished traveller, from Swan River to Adelaide, along the south coast, between April and August, 1870, has been recorded in a former Address.

Several expeditions are, however, in the field to explore the region in the reverse direction, *i.e.* from the telegraphic line towards the west coast. First, that of Major Warburton, who left the Peak River (lat. 38° s.) with his camels and party in October last, and reached Alice Springs, a station on the telegraphic line near Central Mount Stuart (lat. 22° s.). From this point he despatched Mr. Burt, his second in command, to the settled districts for fresh supplies. Mr. Burt performed a journey of 800 miles on a camel in twenty-five days, reaching Adelaide, and returning to Sharpways Springs on March 6, 1873. Major Warburton determined to remain at Alice Springs till the cool weather came on, and would then proceed on his intended westward route.

Another expedition, namely, that of Mr. Gosse, the South Australian Government explorer, was to leave Alice Springs on March 10th for his journey to Western Australia.

A third expedition, under Mr. Ernest Giles, has been sent out from Victoria, under the guidance of Baron von Mueller, who took with him Mr. Carmichael as a volunteer, and Mr. A. Robinson as

an assistant. In his second attempt to penetrate from the telegraphic line towards the sources of the Murchison, he was baffled by a vast salt expanse, which he named Lake Amadeus. This was on October 24th, 1872, lat. 24° 32′ S., long. 129° 38′ E. A lofty mountain was seen 75 miles to the northward, and was named Mount Olga. He passed through a varied country; in some places very arid, and in others most fertile, and brilliant with a diversified flora. The spot reached was near the western meridional boundary of South Australia, and although he was supplied with all necessaries for proceeding, he was compelled to return in consequence of his companions not wishing to proceed. He was, by the last news, however, awaiting the cool season to renew his journey toward the head waters of the Murchison, by skirting the south side of Lake Amadeus, and then striking Mount Olga, where he is confident of finding fresh water. Mr. Giles, in a former journey, had reached nearly to the same meridian, but 100 miles to the northward of it. His botanical and geological notes will prove of great interest.

In the Northern territory, Mr. Cleland and party had ascended the Daly River in boats for 100 miles, and had then found it was 200 yards wide. The Roper has been found to be a very fine river, and the northern harbour of Port Darwin and its town Palmerston promise to become of importance, from the proximity of the new gold-fields, as well as from their good position for commerce.

I cannot quit the subject of Australian Exploration without an allusion to the death of the well-known explorer, Mr. John McKinlay, who died on the 31st of December last, at Gawler East, South Australia. It will be in the recollection of all who have watched the progress of Australian discovery that this meritorious traveller was awarded, in 1862, a gold watch for his successful explorations.

ASIA.—During the past year the Geography of Asia—and especially of Central Asia—has attracted attention to an unusual extent. Commencing from the west, I propose briefly to notice the progress of our geographical knowledge in respect to the various portions of the Asiatic continent:—

Palestine.—As a continuation of the review of Explorations in Palestine which I gave in my last year's Address, I have been furnished by Captain Wilson, R.E., with the following complete *résumé* of the proceedings of the Palestine Exploration Fund.

In June, 1871, the executors of the Fund determined to take immediate steps to complete the survey of Palestine in an accurate and systematic manner, and no time was lost in making the necessary preparations. Captain Stewart, R.E., was entrusted with the conduct of the survey, and two non-commissioned officers of the Royal Engineers, good observers and surveyors from the Ordnance Survey, were selected to accompany him. The Committee were also fortunate enough to obtain the services of Mr. Tyrwhitt Drake, who had previously accompanied Mr. Palmer in his journey to the Tih and Moab, and Captain Burton in his tour through the volcanic region east of Damascus, and who was at the time in Palestine.

On the 8th November, 1871, Captain Stewart landed at Jaffa; but hardly had he commenced work when he was attacked by a severe illness, which compelled him, after transferring the charge of the party to Mr. Drake, to return to England, and eventually resign. Lieutenant Condor, R.E., was appointed to succeed Captain Stewart, and on his arrival at Nablus in July, 1872, assumed the charge of the survey, which has since been carried on under his direction.

A base line, 4·2 miles in length, was measured near Ramleh, on the plain east of Jaffa, and from this the triangulation was carried away in a series of well-shaped triangles. The position of the base line, with regard to the meridian, was fixed by observations of Polaris; and a series of observations for latitude were made of Ramleh, giving results which agreed excellently with those derived by triangulation from the Admiralty latitude of Jaffa. By the end of March, 1872, Mr. Drake was able to report that a complete connection had been established between Jaffa and the triangulation of Captain Wilson's survey of Jerusalem, and that 100 square miles of country had been surveyed and drawn. The triangulation was now carried northwards, and connected, in September, with a second base, 4·5 miles long, measured on the flattest portion of the great plain of Esdraelon. From this base the triangulation was extended to the north and west; and on the 20th January, 1873, Lieutenant Condor reports that it had been carried to Haifa and Carmel, and that 1250 square miles of country had been surveyed and drawn on the sheets prepared in England. The calculated length of the second base was found to agree with the measured length, and the position of Acre, as derived from the triangulation, differs but slightly from that assigned to it by Captain Mansel, R.N., on the Admiralty chart.

The survey is now in progress between Carmel and Jaffa, and Lieutenant Condor hoped to be able to complete this section before the hot weather set in.

In addition to the triangulation, observations for latitude and variation are made at the principal places, and the altitudes are determined by reciprocal angles of elevation and depression as well as by aneroid barometer.

Tracings from the original survey, which is on a scale of one inch to a mile, have been received in England, and bear testimony to the high character of the survey, and the zeal and ability with which it is being carried out. The Committee are now engaged in making arrangements for its early publication.

In connection with the survey, special plans of interesting localities are made on a larger scale, as well as detailed plans of ruins, tombs, &c. The names of all ruins, valleys, hills, &c., with any traditions relating to them, are collected by Mr. Drake, who is also a close observer of the native manners and customs. Meteorological stations have been established by the Fund at four different places in Palestine, and the surveying party is also provided with a complete set of instruments. A geological map of Palestine is being prepared by Lieutenant Condor.

A Palestine Exploration Fund has been formed in the United States to co-operate with the English Fund, and an arrangement made by which the survey of the country east of Jordan will be undertaken by an American party. An expedition fully equipped has recently left Beyrout for the east of Jordan, and we may soon hope to obtain interesting details of its progress. The expedition is commanded by Lieutenant Steever, of the United States Engineers, who is accompanied by Professor Paine and Mr. Vandyke, junior.

In 1870, Captains Mieulet and Dorien, of the French État-Major, proceeded to Palestine with a view of constructing a map of the country; they were actively employed three months, and during this period, besides measuring a base on the plain of Acre, were enabled to make a survey of about 1000 square miles. A map is now being prepared from the field sketches which were made on a scale of $\frac{1}{100000}$, and contains all names written in French and Arabic.

The details of Canon Tristram's expedition into Moab and Edom during the winter of 1871–2 are on the eve of publication, and his work will be found to contain much interesting information on the topography of those countries.

During the present year a beautifully executed map of the northern portion of Palestine, containing information derived from the most recent surveys and expeditions, has been published by Mr. John Murray, and the issue of a second sheet, which will complete the map of Palestine, may be expected at an early date.

Mesopotamia.—In my last year's Address I ventured to hope that occasion would ere this have been given, in connection with a proposed railway between the Mediterranean and the Persian Gulf, to open up and extend our knowledge of the geography of the Tigris and Euphrates valleys; but I regret to say that these hopes have not been realised. Various circumstances have combined to discourage all railway enterprise in that region, and thus to prevent any immediate steps being taken for executing surveys of the different lines. It has been found, in the first place, impossible to raise the capital necessary for an undertaking of this gigantic character without some sort of guarantee from the British Government; and Parliament has decided that the national interests are not involved to that degree which would justify the public funds or the public credit being pledged in support of such an enterprise in a foreign country. The vicissitudes of political life, again, in Turkey have prevented even that partial realisation of the scheme which at one time seemed probable. Midhat Pasha, while employed as governor of Turkish Arabia, had projected a line of railway from Tripoli on the Mediterranean to Baghdad, and he would certainly have carried the project into execution, after his elevation to the Grand Viziership, if the reins of power had remained long enough in his hands; but his tenure of office was so brief that little or no progress was made with the preliminary surveys, and, since his dismissal, the scheme seems to have sunk into oblivion. The only prospect that now offers of benefiting Geography by the creation of a railway system in Asia Minor and Mesopotamia is as a means of access to Persia, where important concessions have lately been made to British capitalists, which for their due development require a rapid and unimpeded communication with Europe; but such schemes are still in the far future, and do not call therefore, at present, for serious consideration. In the mean time it is satisfactory to know that Captain Felix Jones's map of the countries between the Persian Gulf and the Mediterranean is rapidly approaching completion; the whole of the elaborate work of the Anglo-Russian Commission upon the Turco-Persian frontier having been incorporated into the map to represent its eastern boundary, while the valleys of the Tigris and

Euphrates have been laid down, in great detail, from a comparison of all the really authentic materials that exist. An incidental advantage, too, resulting from Captain Jones's work has been that, the attention of the Government having been thus drawn to the inconvenient scale of the Foreign Office copy of the Turco-Persian frontier map, which consists of 20 huge sheets, Sir Henry James has been directed to issue a reduced copy from his office, which shall admit of general circulation; and I may add that the present time is particularly opportune for giving publicity to this beautiful specimen of British cartography; since the two Governments, whose frontier districts were surveyed by our engineers twenty-five years ago, are at length about to carry into effect the various adjustments of territory which were then recommended by the Delimitation Commission.

Persia.—Since our last anniversary, the Society has had the advantage of becoming acquainted with the result of Sir Frederick Goldsmid's geographical labours in the east of Persia. Papers have been read describing the journey of the Arbitration Commission from Bunder Abbas through Kerman to Seistan, and reporting fully on the districts that have been so long in dispute between the Persian and Afghan Governments. The rapid journeys of former travellers through the province of Seistan—of Christie, of Edward Conolly, of Forbes, and of Pattinson—performed under circumstances which prevented anything like accurate observation, had yielded very imperfect results; so that the value of the map executed by the Engineer officer, Major Lovett, under Sir F. Goldsmid's orders, together with General Pollock's sketch-route along the Helmend from the town of Bost to the Lake, are all the more appreciated. It now appears that a large canal, of which the traces are still to be seen, bearing the name of *Jüt-Gershasp*, left the Helmend in antiquity at *Roodbár*, and penetrated 50 or 60 miles into the desert to the south-west, where it watered the old capital, which was called Agriaspe by the Greeks and *Ram-sheheristan* by the early Arabs. The other great canal of *Siná-rúd*, which watered the town of Zaranj, and supplied all the lesser irrigating channels to the south of the river, was probably the same arm which now leaves the Helmend at the *Bend-i-Kohek*, and which has been assumed in most of the recent maps to be the true bed of the river. The old Zaranj, so celebrated in Oriental history, would thus be represented by some of the ruins in the neighbourhood of Sikoha; while *Doshakh (or Jellalabad)*, to the north of the river, which Macdonald Kinnier

identified with Zaranj, would be in reality the *Qurnein* of the Arabs (the names having the same significance in Persian and Arabic of "the two horns"), which was the native place of the famous Soffarian dynasty. It has been now decided that the line of delimitation between Afghanistan and Persia should follow the bed of the river Helmend from the Lake to the *Bend-i-Kohek*, and from that point should be marked by an arbitrary line drawn across the desert to a peak in the southern hills; so as to give to the Afghans the entire right bank of the Helmend down to the Lake, together with the left bank as far west as the Bend; while the whole extent of Seistan Proper, on the left side of the river below the Bend, and irrigated by canals thrown off at the Bend, is allotted to the Persian crown. The impartiality of this award may be judged of from the fact that at first it was acquiesced in neither by one party nor the other; but wiser counsels have now prevailed, and although it must be admitted that the distribution of territory, considered geographically, has not much to recommend it—inasmuch as it is independent for the most part of any natural division—still it was at the time the only practical settlement that was at all possible; and it will be respected probably in the future, when passions have cooled, as under the circumstances a fair and equitable compromise.

It is most favourable to the interests of Geography that this system of avoiding political complications by determining disputed lines of frontier through the agency of mixed commissions, accompanied by professional engineers, should be generally adopted in the East. We have already seen the admirable geographical results achieved by the several arbitration commissions which have surveyed the Turco-Persian frontier, and more recently the Perso-Belooch and Perso-Afghan frontier, and we may anticipate an equal geographical success when the same practical treatment shall be applied to those other localities which as yet have merely figured in diplomatic correspondence. The frontier line, for instance, between Khorassan and the Turcoman Steppes, which in the Russian maps is made to follow the main stream of the Atrek to the vicinity of *Bújnúrd*, but which is defined by Persia as the northern watershed of the Atrek and its right-hand affluents as far as *Abiverd*, will assuredly at no distant day require to be surveyed and mapped, no European, as far as I am aware, having ever yet passed along the northern slope of the *Kuran-dagh*, and its prolongation from the shores of the Caspian to *Serakhs;* and in the same way a commission must *inevitably* sooner or later visit the whole extent of the Afghan

frontier, from Seistan by Herat, the *Murghâb* and *Meimeneh*, to the Oxus, and along that river from *Khoja Saleh* to the Lake Victoria of Wood, the political dependency of many districts upon that line, such as *Roshan*, *Shignan*, and *Darwaz*, being still subject to uncertainty, while the position of several important points is as yet undetermined. In the mean time, Colonel Yule, indefatigable as ever, has being doing all he can, in default of scientific observation, to throw light on the geography of the Oxus. He has edited, with corrections and explanations, the valuable reports both of Pundit Munphool on Badakhshan, and of Feiz Bukhsh on the route from Cabúl to Yarandk, and in his elaborate introduction to Wood's travels, which was published at the close of last year, he has brought together and exhibited in a clear and connected form everything that is known upon the subject. His most curious discovery perhaps is that which relates to the origin of Klaproth's misapprehension of the geography of the Oxus, a misapprehension which is apparent in all the pseudo travels that he concocted, and which to the present day vitiates the maps of the Russian Government and hampers their diplomacy. Yule has discovered that a certain square of the Chinese map, constructed in 1759, which was the groundwork of Klaproth's geographical knowledge, had been accidentally turned round through an angle of 90°, so that the district of *Wakhán*, for instance, instead of being laid down in the same parallel as Badakhshan, was placed in the map 100 miles to the northward, and thus appeared to Prince Gortchakoff to be conterminous with *Kara-tegin*. Colonel Yule's memoir on the subject, illustrated with maps, will appear in the forthcoming volume of the Journal, and will well repay perusal.

Nor must I omit to mention the facilities for extending our geographical knowledge of the various mountain-chains of Persia, which are likely to be afforded through the concessions that have been lately made to Baron Reuter by the Government of that country. The most important of these concessions relates to the creation of a railway system throughout Persia, which shall not only connect, in the first place, the capital with the Caspian, as the easiest means of entry into the country, but shall also provide in the sequel for the radiation of lines leading from Teheran to the Persian Gulf, the Black Sea, and the Mediterranean. Measures, indeed, are being now organised for undertaking the preliminary surveys which will be required to determine the lines of route to *the south* and west that present the least engineering difficulties;

and many portions of this vast country, which are now unknown except from native report, will thus soon be represented on the official maps. I may add that the accessions to our knowledge of the geography of Persia, through the recent journeys and observations of our Engineer officers, employed both in the telegraph department and with the arbitration commissions, are already so considerable that Majors St. John and Lovett have been employed by the India Office to construct a new map of the country, which will admit of enlargement and improvement as additional materials are accumulated.

I would further draw attention to the very excellent geographical work in regard to Eastern Persia and Central Asia that is being accomplished by the Topographical Department of the War Office. A most valuable summary of all our recent information regarding these countries has recently been issued "for official circulation only," and the maps which accompany the pamphlet, and which have been compiled from all available sources of inquiry, Russian as well as English, are by far the most complete and the most reliable that have ever yet appeared. These maps, indeed, are of so much interest and value that, although issued confidentially at present, I cannot avoid expressing a hope that they will soon be rendered accessible to the public.

And, in concluding this brief sketch of the progress of Geography in Eastern Persia and Central Asia, I would point to the pending operations against Khiva, and remind the Fellows that the march of the Russian columns across the Steppes, accompanied as they are by professional topographers, is in reality a series of exploring expeditions, each line of route lying through portions of country never before mapped and surveyed, and the general result of the campaign thus promising a vast accession to our geographical knowledge. Although, indeed, there were extensive reconnaissances previous to the concentration of the troops, both in the Turcoman desert between the Caspian and Khiva and in the barren tract intervening between the Lower Jaxartes and Oxus, still in no single instance, I believe, had the line to be followed by the different columns been examined from beginning to end; and in some localities, such as in the interval between the Bukan Hills and the Oxus, and again to the south-west of Khiva, it is thus possible that difficulties may yet be found to exist that will essentially impede the march, though not, of course, to a degree that can at all affect the *eventual success* of the campaign.

Kashgaria.—The interesting and exhaustive papers of Messrs. Shaw and Hayward, published in the Journal of our Society, upon the geography of Chinese Turkestan, have rendered us familiar enough with the high-road leading from the frontiers of Ladak through the towns of Yarkend and Yangi-Hissar to Kashgar; but we really know very little of the vast region intervening on one side between Yarkend and Samarcand, and stretching on the other to the frontier of China Proper. It is, therefore, of the utmost interest to us that we now learn of the deputation of a well appointed mission, under the guidance of that experienced diplomatist, Mr. Douglas Forsyth, to the court of the Ataligh Ghazi. The geographical importance of this mission is so well explained in a letter which I have recently received from Mr. Forsyth that, in preference to offering any further observations of my own, I venture to publish from it the following extracts :—

"*En route* to Simla,
"April 2nd, 1873.

"You will have heard that Lord Northbrook has decided on sending an Embassy to the Atalik Ghazee, and has appointed me to the charge of it. The expedition is to be well equipped, and we shall remain in Kashgaria all the winter. This is a glorious opportunity for obtaining geographical and other scientific information; and nothing shall be wanting on my part to secure complete exploration of parts hitherto unknown.

"As you are aware, I have long turned my thoughts to Central Asia, and was the first to propose opening out this country, and I induced Shaw to make his brave and successful voyage of discovery. Our last expedition was not properly equipped, but I was fortunate in having an amateur geographer in my companion and assistant Shaw; and though his researches were necessarily imperfect, it was very gratifying to find that your Society acknowledged so handsomely his exertions.

"On the present occasion, however, I am glad to say Lord Northbrook has consented to allow me the services of a professional surveyor, and Colonel Walker has selected one of his best assistants, and one of the well-known Pundits, to accompany me, and thus I hope to be able to lay before the Geographical Society, on my return, complete and thoroughly reliable information.

"Should there be any topics to which you would wish me particularly to turn my attention, I shall be glad to have your advice and help. I am informed by the Envoy, Mohamad Yakub Khan, who has himself travelled as far as Karashahr, that there is a river which flows from that town in a southerly direction towards Tibet, and that a regular caravan route goes from that city to Lhassa. The Atalik sent one of his officers across the Desert of Gobi to Khoten, who reports that the country intervening is a wilderness rather than a desert, in which grass, wood, and water abound, and plenty of animals of all kinds are to be found. I am very anxious to have this explored by some competent man; probably we shall depute the Pundit for this purpose.

"On our return it is probable we shall take the route over the Pamir and through Badakhshan, and thus be able to throw professional light on those regions.

"We shall, probably, leave India in July, taking the route through Ladak and by the Chang Chemno Valley.

"T. D. FORSYTH."

The Royal Geographical Society, I feel assured, takes the greatest interest in Mr. Forsyth's success, and will impatiently await the reports that he may send us of his progress during the ensuing autumn and winter. It is a further subject of congratulation that our medallist, Mr. Shaw, has just returned to India to resume his functions as Commissioner at Ladak, so that his services will be available on the spot to facilitate the passage of the mission through the territories of the Maharaja of Kashmere, and to co-operate with Mr. Forsyth in pushing discovery both to the east and west, after the party has fairly taken up its position at the court of the Ataligh.

Dardistan.—Dr. Leitner, the able and energetic *savant* who has contributed so much to our knowledge of the countries lying between Badakhshan and Kashmir, has recently arrived again in England from Lahore, bringing with him a Siah Posh Kafir, as a living illustration of the ethnology of the region. He has brought also large collections of antiquities, statues, arms, and coins, the fruits of his own indefatigable researches; and also numerous manuscripts of such of the races as possess any written character. These latter, together with the Græco-Buddhistic sculptures brought over by Dr. Leitner, cannot fail to excite the interest of all students of Asiatic history and ethnology. The collections, I understand, are for the present deposited in the International Exhibition at Vienna.

Great Trigonometrical Survey of India.—This work during 1871-72 was carried on under the superintendence of Major T. G. Montgomerie, R.E.; the great triangulation was extended over a total direct distance of 396 miles, and with the secondary triangulation a total area of 23,840 square miles has been covered with accurately-fixed points for future topographical and geographical purposes.

The operations were carried over various little-known parts of India, one series passing through the wild territory south of the Mahanuddy River from Belaspur towards Jeypoor—a hilly tract west of the coast between Calcutta and Madras, which has hitherto been visited by very few Europeans. The work was much hindered by the unhealthiness of the country and the number of tigers.

A farther extension was made in Assam. In the south of India the operations have embraced a portion of the west coast south of

Coimbatore, which may be said to be almost *terra incognita*. Though so near to Madras, the geography of that part of the country has made very little progress since the beginning of the century, survey operations having been mostly directed to our acquisitions to the north, whilst Madras, which at first was most favoured as to surveys, has made no progress. Hills, though known to exist to the south of Ootacamund, were barely indicated on the maps, and yet Major Branfill's triangulation now proves one of them, viz. the Aneimudi Peak, in the Aneimallei range, to rise to an altitude of 8837 feet above the sea, or 200 feet higher than Dodabetta, which has hitherto been supposed to be the highest peak in Southern India; and in determining the heights of the Aneimallei range, a valuable addition has been made to the geography of Southern India.

A farther important addition has been made by that portion of Major Branfill's triangulation which extends about 120 miles along the coast of Magalore, which covers a large gap which had been left unsurveyed by the early operations of Colonel Lambton. A large number of heights were moreover determined in the above tracts by aneroid barometers, which will be extremely useful as giving a general idea of the levels of the country.

Lieut. Rogers, R.E., also determined a number of heights by the aneroid in Madras and in the Nizam's territory, which will be similarly useful.

All of these heights will be published hereafter in the forthcoming volume of our Journal.

The topographical surveys in Gujerat and Kattywar have made considerable progress, and already cover a large portion of the blanks which the atlas sheets of India have hitherto shown in that quarter. The Kattywar survey embraces a portion of the Gir Mountains, and during the season Capt. Trotter, R.E., in charge of the survey, was fortunate enough to shoot four of the lions which are still numerous in Kattywar, though they only exist in very small numbers in two or three other places in India.

The regular survey operations in the Himalayas embraced portions of the British districts of Kumaon and Gurhwal, including some of the south-eastern sources of the Ganges proper, such as those running from the Mana and Niti passes; the triangulation was carried to the head of the Niti pass, and three stations were established on peaks on the great ridge of the Himalayas, from which a good view was obtained of the Trans-Himalayan range across the upper basin of the Sutlej. In this snowy range eight

conspicuous peaks were fixed. One of these is the celebrated Kailas Purbat, which dominates over the Mansarowar Lake, and reaches an altitude of 22,028 feet above the sea. The connection of these peaks with the great triangulation will assist in determining the topography of other parts of Tibet, as they are known to be visible on all sides to very great distances in the interior.

Considerable progress has been made with the regular survey of Kumaon and Gurhwal Mountains, and we may shortly expect to have the finished maps of the whole; the sheets already published, on the scale of one inch to the mile, compare well with the Swiss and Italian maps of the Alps, which is gratifying, as it is the first time that it has been attempted to delineate the topography of mountains rising to upwards of 25,000 feet on such a large scale.

In cartography Major Montgomerie has published a map of routes in Northern India, including the whole of the routes in the Western Himalayas, Kashmir, &c., and extending to Yarkand on the north-east, and to Afghanistan on the west.

Major Montgomerie has also commenced a series of Trans-Frontier Maps, based on the operations of the Great Trigonometrical Survey, and on the various explorations that have been made from time to time by British and Asiatic explorers from the side of India, more especially on those recently made by Asiatic explorers. Two sheets of these Trans-Frontier Maps have already been published, which will be useful in studying questions connected with the extensive frontier of British India, or with any of the foreign territories lying beyond it.

The Trans-Himalayan and Trans-Frontier explorations, under Major Montgomerie's instructions, have been continued in various directions on the western, northern, and north-eastern frontiers. On the whole, great progress has been made, and one continuous line of explorations beyond the frontier has now been carried right round India, and the *terræ incognitæ* beyond the boundary have been greatly diminished.

In his report for 1872, Major Montgomerie gives the details of explorations made between Darjiling and Nepal on the south, and Shigatze, in Great Tibet, on the north. The explorer, a native of India, went right round the great Mont-Everest, penetrating on the north to the Sang-po, or Brahmaputra River, and thence south-west over the Tingri-Maidan, the most extensive plateau on the south of the Himalayan watershed. This plateau nowhere falls to a lower level than 13,500 feet, and though it is drained by rivers which flow

direct into India, it has not as yet been visited by a single European. It is used by the Tibetans for grazing their flocks, and has from time to time been crossed by Tibetan and Nepalese armies, though the routes leading to it are such on the side of Nepal as to make it difficult for a man to pass with a load.

The path along the Bhotia River is carried along the sides of a precipice overhanging a chasm for nearly half a mile in one place. Amongst other places this exploration has fixed the position of the celebrated Buddhist monastery Sakya, which is second only to that of Tashi-Lumbo. The route, 844 miles in length, opens out 550 miles of entirely new ground, and with its bearings, branches, &c., elucidates the geography of nearly 30,000 square miles of what has hitherto been all but *terra incognita*, though the source of the Kosi River, the largest tributary of the Ganges. The courses of the upper feeders of the Kosi have, indeed, hitherto been a puzzle to Indian geographers.

The exploration is interesting, as giving us some idea of the topography of the mountains around Mont-Everest, the highest in the world, and also because it determines the position of the Himalayan watershed at two more points of this little-known portion of the great range. As usual, the watershed has been found to be far behind, or north of, the great peaks, which are visible from the plains of India, and apparently forming a continuous chain.

During the season of 1871-1872, the Great Trigonometrical Survey completed 10,310 square miles of principal, and 13,530 square miles of secondary, triangulation. Mr. Rossenrode, on the Bider Longitudinal Series, and Mr. Beverley, in prosecuting the Assam Valley Triangulation, encountered great difficulties, owing to the wild and malarious nature of the country: but good progress was made both on those series and on the Bangalor Meridional and Mangalúr Longitudinal Series. Major Branfill who is conducting the latter series, has made the important discovery that one of the peaks of the Anamalley Range (8837 feet above the sea) is higher than the Dodabetta Peak on the Nilgiris, which had hitherto been supposed to be the highest mountain in India south of the Himalayas. Topographical operations have been carried on in Guzrat, Kattywar, and Kumaon; and the completion of Captain Basevi's pendulum observations has been entrusted to Captain Heaviside.

Seven Topographical Surveys have been at work, under the immediate superintendence of the Surveyor-General, in Gwalior,

Khandesh, Vizagapatam, Belaspur, Malwa, Rajputana, and the Lushai country. The ground occupied by each party is very wild and unhealthy, for, as the more civilised parts of India are surveyed, it is necessary to penetrate into the thinly-inhabited mountains and deserts; and thus the great work steadily advances towards completion. There has been the usual activity in the drawing and compiling branch of the Surveyor-General's office at Calcutta, and several useful general maps have been issued, while great progress has been made in engraving the sheets of the Atlas of India.

The Revenue Surveys in the provinces under the Government of India have hitherto been divided into two branches. The native surveys, for settlement purposes and for the measurement of fields, are useless for geographical purposes. But the professional revenue surveys are most valuable and accurate; and the work of such surveyors as Colonel Johnstone in the Punjab, as Captain Tanner in Bhawalpur, and of others, forms an important addition to our geographical knowledge of India. I dwell particularly on the difference between the rough native surveys of fields and village boundaries and the accurate professional revenue surveys, because a passage in my Address of last year on this subject (p. 71) may perhaps be open to misconstruction. It is very satisfactory to find that the system of prosecuting the revenue surveys on strictly accurate principles in all their details, and of entirely getting rid of the old inaccurate native measurements, is to be introduced, and that a proper cadastral survey has already been commenced in the Moradabad and Muttra districts of the North-West Provinces. The Madras Revenue Survey, which has been executed on correct principles from its commencement, has made good progress during 1871-72.

Russian Explorations in Northern and Central Asia.—Among the latest achievements by Russian geographers are the astronomical observations of Scharnhorst, who accompanied Kaulbar's mission to Kashgar, and by means of Pistor's circle and four pocket chronometers succeeded in determining 13 new positions on the route between Tokmak and Kashgar. Scharnhorst has also taken a series of magnetic observations in Turkestan, which will fill in the gap left between observations in Siberia, Orenburg, the Caspian Sea, Persia, and Afghanistan.

The expeditions of Prjivalsky to South-West Mongolia and the Upper Hwang-ho, have produced results of much importance to

Geography. This traveller passed ten months in 1871 in exploring the south and south-east of Mongolia, between Dulai-nor and the frontiers of the Chinese province of Hansu. At the beginning of last year he set out again from Pekin upon another expedition to the same country, with the intention of penetrating to Lhassa in Thibet, and, if possible, of reaching in that way Russian Turkestan; or failing this, of making his way into India or Southern China.

On the 5th March, 1872, he left Kalgan, and, having been much detained on his road by snow-storms and bad weather, arrived on the 9th April at the Yellow River. Prevented from crossing that river at Munni Ula, and from entering the Ordos territory, he was forced to make his way to Bautan, and to cross at the same place as before, and, giving up all idea of entering Ordos, to make the best of his way along the left bank of the Yellow River to Alashan.

On the 26th May he arrived at the Alashan town of Din-yuang-ing in time to join a caravan of 30 Mongols and Tibetans who were about to start for the temple of Chob-seng, in the province of Kansu, five days' march from Lake Koko-nor, and about the same distance from the town of Sining, which was occupied by the Mussulman insurgents, who had compelled the Chinese troops to evacuate the town, and the Chinese amban (governor) to take refuge at the town of Sa-yang-cheng, on the borders of Kansu and Alashan. Chob-seng is 22 days' march from Din-yuang-ing, and is situated in the mountains north of Lake Koko-nor. Here M. Prjivalsky expected to gather a rich harvest of zoological specimens, as, according to the report of the Mongols, these mountains are well clothed with forests, which abound in wild beasts, such as tigers, panthers, deer, musk, &c., and the yak or tangut buffalo and long-horned antelope are to be found near Koko-nor. Later news of this expedition is communicated by General Vlangali, the Russian Minister at Pekin, who telegraphed to say that Prjivalsky passed the autumn of 1872 near Sining, north of Koko-nor, and intended wintering near the lake.

Some interesting details of this expedition are given in the Transactions of the Russian Geographical Society, where some account will also be found of the insurrection of the Mussulmans, which is depopulating vast tracts of country and destroying towns and villages between Russian territory and the Chinese province of Kansu.

In the last Anniversary Address allusion was made to the explorations in the steppes of Turkomania to the east of the Caspian, and in the vicinity of Krasnovodsk Bay. According to Colonel Stebnitzky's report, a further distance of 155 versts of the old river-bed of the Amu-daria has been explored during the course of last year, which, together with the 282 versts explored in 1871, makes a total of 437 versts of explored river-channel, and it is estimated that not more than 210 versts (140 miles) intervened between the most advanced position of the Russians and Khiva, which has been appropriately termed the western gate of Central Asia. Explorations have also been made at Mount Kouren-tagh and along the Atrek from its tributary, the Simbar, to its embouchure in the sea.

In the autumn and winter of 1871, Colonel Markosoff organised three reconnaissances into the steppes, with the view of putting an end to the raids of the Turkomans, by striking a blow at their chief centres of habitation. The first of these expeditions was directed a little to the north of east from Krasnovodsk to Sari-Kamish, on the road to Khiva; the second to the Centre and Lower Us-boi (the old river-bed of the Oxus); and the third to the Atrek, between which river and the Kara-su there is a long strip of so-called Turkoman territory. Topographers accompanied all three detachments, and exact route measurements were made on the march. The first reconnaissance proved the practicability of the road from Krasnovodsk to Khiva, along its whole extent, for all kinds of troops, notwithstanding Mouravieff's and Vámbéry's remarks to the contrary.

An important *reconnaissance* has recently been made by an able Russian officer, M. A. Charoshchin, of the sandy desert of Kizil-Kum, lying between the Jaxartes and the Oxus, at the lower part of the courses of these rivers. The only account of this exploration which I have been able to obtain is that given by M. Vámbéry, in the May number of 'Ocean Highways,' at p. 59:—"M. Charoshchin traversed the desert in various directions, and visited parts of it which were unknown even to the Central Asiatics themselves. His travels extended over all the principal halting-stations throughout the steppe; the positions of the wells were noted, and the encampments of the Turkoman and Kirghiz tribes, which are numerous along the outlying hills at the foot of the Karatau, and from Jizak to the well of Balta-chaldar. According to the statement of these people the sands of Kizil-kum

are drifting year by year to the south, and it is feared that the north-westerly part of the Khanat of Bokhara, as far as the alluviums of the Zarafshan, will soon be covered by them."

As Krasnovodsk will undoubtedly become a great depôt for the Trans-Caspian trade, a few remarks on the route from thence to Khiva will not be out of place.

The road from Krasnovodsk follows for some distance the shore of Balkhan Bay, then enters the Kuwatagh Mountains, passing over a rocky soil covered with small pebbles to the wells of Siuili, where there is a large cemetery and traces of frequent encampments, thence the road runs almost due east, over a perfectly level ground to the wells and new Turkoman fort of Hezli-ata, situated in a hollow with a red clay soil, and surrounded by steep chalk cliffs 200 feet high. Here there is a cemetery and a mosque, the walls of which are inscribed with the names of the Turkoman dead. From Hezli-ata roads diverge in all directions, the Khiva road we are describing continues across sandy soil overgrown with grass and small bushes, to the salt marshes of Bulmudsir, and thence to the wells of Oglamish and Chagil; 35 versts from the latter place is the elevation of Begendzali-Kir, the highest point of the journey. The road continues for 10 versts over a level plateau, and suddenly descends a precipitous cliff to a salt marsh, 3 versts from the descent, in which are the wells of Kum-Sebsheng, in a hollow like Hezli-ata; the southern border of this depression is formed by the above-named Begendzali-Kir, the northern border is called Kaplan Kir, and is part of the well known Chink (edge) of the Ust Urt plateau. 33 versts from Kum-Sebsheng the road gradually ascends the Kaplan-Kir, and, after passing the wells of Kazakhli, crosses the Ust Urt for 35 versts over a hard, and therefore barren soil, to the wells of Uzun-Kui, which are remarkably deep and have excellent water; 25 versts beyond Uzun-Kui is the Chink, which is very steep here, 40 versts beyond this descent of the Chink the road approaches the large salt lake of Betendal-kul, on the shore of which are numbers of small shell-fish, of a similar description to those found at Krasnovodsk Bay, and on the shores of the Caspian. Following the north-eastern shore of this lake, the road approaches the wells of Sari-Kamish, which are but 8 versts distant from the extremity of the lake. Sari-Kamish is situated in a ravine, which, in all probability, is the dried channel of the Amu-daria (Us-boi), 100 to 150 fathoms wide from bank to bank in this part, but considerably wider near the lake where the banks are sloping; its bottom is

covered with sand, in which there is sparkling mica; in some places, as at Sari-Kamish, it is covered with a growth of underwood and deciduous trees of good size. The right bank is invariably higher than the left. The road we have briefly described is generally over rocky ground, sands, or salt marshes; the ascents are gradual, the descents, though steep, present no great difficulties; the water in the wells is slightly bitter, but is everywhere fit for drinking, and good for cooking purposes.*

Another expedition, organised by the Russian Geographical Society, is that of Kuznetsoff, to the western provinces of Russia, of which a report will shortly appear; another is Staritzky's, to the sea of Japan. M. Staritzky's report on his researches during five years—1866–1871—in the Pacific Ocean, the Sea of Japan, the coast of Russian Manchuria, the Island of Saghalien, the Sea of Okhotsk, and Kamchatka, is very interesting. In 1868 his labours were interrupted by the disturbances caused by the Manzi in the south of the Ussuri country, which obliged him to take an active part in the defence of the country. He took a number of astronomical observations, and determined precisely the longitude and latitude of thirty-eight positions between 15° and 62° N. lat., and 120° and 160° E. long. These observations have been connected with the best Russian as well as foreign surveys in the Pacific Ocean, and have been corrected by the absolute longitude of Vladivostok, which has been determined by six eclipses of the moon, calculated by Curtazzi, astronomer at Pulkowa Observatory, and corrected by lunar observations taken the same day at Pulkowa and Greenwich, so as to reduce the longitude of Vladivostok to a second. Staritzky also conducted a series of soundings which prove the sea of Okhotsk to be of no great depth. Of sixteen soundings taken by him in different parts of this sea, the greatest depth was 350 fathoms, while the neighbouring waters are of great depth. In the Pacific Ocean, 200 leagues from the Kurile Islands, there was no bottom at 2100 fathoms; and the same result was obtained in the Sea of Japan at 1800 fathoms. In the Indian Ocean, 100 leagues from the island of St. Paul, the bottom was reached at 1650 fathoms. M. Staritzky also measured the height of several mountains, among others the volcano of Koriak in Kamchatka, which is 11,000 feet high. He discovered the port of Kinegda in the north of Saghalien

* The route thus described from Krasnovodsk to Sari-Kamish is laid down on the map published in 'Ocean Highways' for April, 1873, p. 4, from the survey of Captian Skobolef.

and the island of Moneron, which had never before been visited by a European. M. Staritzky's maps and plans have been published by the Hydrographical Department of the Ministry of Marine, and are valuable additions to the hydrography and cartography of the Northern Pacific and its coasts. Among the latest additions to the cartography of Russia is a geological map of that country by Helmersen, and part of a new map of the Caucasus, on a scale of 20 versts to the inch.

Before concluding this sketch of the progress of Russian geography, I will allude to a work which promises to be of the greatest value to geographers—the 'Geographical Lexicon of the Russian Empire,' published by direction of the Russian Geographical Society, under the supervision of Semenoff. This comprehensive work will, it is expected, be completed shortly. It contains every kind of geographical and statistical information about Russia, its mountains, seas, rivers, territorial divisions, towns, population, &c., &c.

China.—One of the most remarkable journeys performed, in recent times, by a European in China, is that of Baron Richthofen in 1871-2, from Peking through the north-westerly provinces of Shansi, Shensi, and Sze-chuen. This accomplished traveller left Shanghai for Pekin on September 27, 1871, and set forth on his long journey from the capital on the 25th of October, accompanied by an interpreter and a Chinese servant. From Peking he proceeded, by way of Kalgan, to Tai-yuen-fu; thence, traversing the whole of Shansi from north to south, he arrived at Si-ngan-fu, and afterwards crossed the Sin-ling Mountains to Ning-Kiang, near the borders of the remote province of Kan-su. From Ning-Kiang he travelled, *viâ* Kien-chau and Mien-chau, to Ching-tu, and thence to Su-chau-fu on the Yang-tze-Kiang, whence he descended the great river to Shanghai. This journey, in addition to previous undertakings of a similar kind through the central and eastern provinces of the empire, have rendered Baron Richthofen a high authority on Chinese geography and products. As a geologist and skilled observer in other departments of science, he has turned his opportunities to good use, as may readily be seen by his Report on his last journey to the Committee of the Shanghai Chamber of Commerce, which contains observations of great interest on the geography, products, agriculture, and trade of the districts he traversed. His Report is divided into sections, each supplying details of great value to the geographer, although written more especially for the *information* of the commercial community. The principal of these

sections are the following:—On the coal-mines of Chai-tang; on the geology of the district beyond the Great Wall near Kalgan; on Mongolian commerce and products; on the "loess," as he prefers to term the remarkable deposit of rich loam which clothes to a great depth nearly the whole of Northern China, and is the cause of its great agricultural wealth and vast population (the Baron's theory of its origin is the gradual precipitation over the face of the country, by the easterly rains, of the fine dust produced by the decomposition of the rocks and high winds); on the basin of Tai-chau and Hin-chau, and on those of Tai-yuen-fu and Ping-yang-fu; on the province of Shansi; on northern Shensi; and on the high-road from Si-ngan-fu to Ching-tu-fu.

Baron Richthofen has now returned to Europe, and it is to be hoped he will soon give to the world the results of his extensive explorations, in a form generally accessible to the reading public. I am glad to be able to add that he has communicated to us, through General Beauchamp Walker, of the British Embassy at Berlin, a valuable paper on the distribution of Coal in China, which is intended to be read at one of our evening meetings.

AFRICA.—*South Africa.*—Mr. St. Vincent Erskine, who distinguished himself a few years ago (in 1868) by his successful attempt to trace the Limpopo down to its mouth, has again accomplished a journey of considerable extent and danger, through a new district of South-Eastern Africa. The chief object of his present journey appears to have been a diplomatic one, the conveyance of messages and presents from the Colonial Government of Natal to the chief Umzeila, whose territory extends for a long distance parallel to the east coast between the Limpopo and Zambesi rivers. Mr. Erskine left Durban on the 25th of June, 1871, proceeding to Inhambane by sea; at which place he disembarked and commenced his journey on foot in company with Mr. Dubois. He proceeded first to the mouth of the Limpopo, to complete its examination, which had been left unfinished on his former visit. The result of his survey was the conviction that the river was navigable for fifty miles from its mouth by the smaller kinds of sea-going vessels; for, although there were formidable bars at the entrance, channels of sufficient depth existed between them, to admit with careful pilotage the entrance of ships. He subsequently visited, a little further north, the river known as Zavora on our maps—a lake-like stream, 600 yards wide *in some places*, but flowing through a desert, sandy country. He

next travelled to the Sabia River, through the country peopled by the Umhlenga and Mondonda tribes of Kafirs. Thence he crossed the sources of the Gorongosi, which flows into the sea between the mouth of the Sabia and the Bay of Sofala, and reached the upper waters of the Bosi, a large river whose embouchure lies a little north of Sofala. Umzeila's kraal was reached on the 22nd of March, 1872, and he started on his return journey—a long wearisome march by land *viâ* Lydenburg—on the 29th of July, reaching the capital of Natal on the 25th of October.

The main results of this important journey are a description of the vast bush-covered plains extending along the east coast of Africa from the Limpopo to the Zambesi, about 600 miles in length and 250 miles in breadth; the discovery of many large rivers, not hitherto indicated on any map; and a vast amount of curious information relating to the native tribes.

Mr. Erskine was provided with instruments for making a survey of the country travelled over, and he employed them so well that the positions of no fewer than 350 places were laid down by astronomical observation for latitude; the chief position, namely, that of Umzeila's kraal (20° 23′ s. lat.; 32° 30′ E. long.), being determined by a series of cross observations for longitude and latitude. The most northerly point reached was in 20° s. lat. He confirmed the prior observations of Mauch regarding the existence, in this part of Africa, of an extensive tract of plateau land from 3600 to 4000 feet above the level of the sea, perfectly healthy and well-fitted for occupation by Europeans. Unfortunately, Mr. Erskine's Journals and records of observations, together with much other property, were lost by the upsetting of a waggon in a flooded stream, when near home, on the return journey. He has thus been unable to fulfil his intention of presenting a complete Survey Report to the Society. A Journal kept in a pocket book remains, together with a map of part of Umzeila's country, on a scale of 8 miles to the inch; so that we may hope to have a sufficiently accurate record of some part, at least, of this important journey.

Dr. Livingstone.—I have been in some doubt as to the proper way of continuing my report to you on African exploration, because, although I closed my last Anniversary Address somewhat abruptly with the bare announcement, received by telegraph, of Mr. Stanley's arrival at Zanzibar, still, at the commencement of the present session I was able to present you with a connected narrative of all Livingstone's previous proceedings—in fact, with as full a

detail of the additions made through the great traveller's late explorations to our knowledge of the geography of Central Africa as we possess at present—and I am naturally reluctant to take up your time with the mere formal recital of a twice-told tale. But, on the other hand, I am warned that the Anniversary Addresses are the only permanent record of our geographical progress—intermediate reports being confined to the 'Proceedings'—and I am constrained, therefore, with a view to the continuity of the narrative, to travel over much of the same ground. I proceed, then, to record that Mr. Stanley, who parted with Livingstone at Unyanyembé in March 1872, was charged by the great traveller to bring all his journals and letters, his register of observations and rough maps—all the results, in fact, of his six years' exploration of Central Africa—to England; and well and faithfully he executed the commission. An accident, which detained him for a month at the Seychelle Islands, retarded his arrival in England until the first week in August, when our Geographical meetings were over for the season, but an opportunity having occurred, at the meeting of the British Association at Brighton, to introduce Mr. Stanley to the British public, and to make generally known, through his addresses, the brilliant discoveries which Livingstone had achieved in Central Africa, the most intense interest was excited throughout the country. We are not yet in a position to trace Livingstone's wanderings in detail, or to lay down his entire route with mathematical accuracy; for his journal has been entrusted to his family, to be kept unopened till his return to England, and his very extensive series of observations are being worked out at his express desire by Sir Thomas Maclear at the Cape of Good Hope; but in the mean time his despatches to the Foreign Office and his letters to his private friends have, at any rate, so far acquainted us with the general features of the river-system which he has been now for so many years exploring, that an outline map of Equatorial Africa has been constructed by Mr. Keith Johnston; and I have the authority of Sir Thomas Maclear for stating that the delineation upon this map of the course of the rivers, obtained merely from the bearings and distances given in round numbers in Livingstone's letters, coincides with remarkable accuracy with the positions that have been from his observations astronomically determined. Livingstone's late discoveries in Central Africa may be thus briefly summarised:—He finds the watershed between the streams running to the north and south to lie upon an elevated plateau, which stretches along the parallel of 12° south latitude

for about 700 miles from west to east, and which rises to a height of about 6000 feet above the sea-level. From the eastern portion of this table-land descend a multitude of streams which fall into Lake Tanganyika at its southern end, after passing through a sort of supplementary lake of extreme beauty, which has the name of Liemba. Further to the west the waters drain off apparently into four distinct valleys, all of which are at a much lower level than Tanganyika, from which indeed they are separated by a chain of hills, running down from the Balegga Mountains, and forming the western border to the lake. The easternmost of these valleys is filled by a river called Chambeze in its upper portion, which in the first instance runs westward to Lake Bangweolo, and then northward under the name of Luapula to Cazembe's capital. After passing through another lake, Moero, the river takes the name of Lualaba, and then flows northward in the same direction as Tanganyika, till it reaches the seventh degree of south latitude. Then it turns to the west, passing through Lake Kamolondo and skirting the Manyema country in a bend which circles round from south-west to north, until it is finally lost sight of in a reedy lake, which is supposed to extend almost up to the equator. The next valley contains the River Lufira, or, as Livingstone has named it, Frere's Lualaba. This stream is not inferior in size to the Luapula, and is believed to disembogue in Lake Kamolondo, but it has not yet been followed down, nor indeed has it been seen except by the Pombeiros, who crossed it in a canoe near its source in 1806. The third and fourth valleys are filled by the two arms of a river which is probably the most considerable of the whole system. The right arm of this river is called the Lulua and the left the Loké or Kassabi. Both of these arms were previously known; the Lulua and its numerous feeders having been explored by the Pombeiros and by Graça, while the upper course of the other arm, named the Loké or Kassabi, was visited by Livingstone himself in 1855, and was followed down by Ladislaus Magyar in 1850 to a point below the junction of the Lufira. Livingstone gave to the united streams the name of Young's Lualaba, and ascertained, while staying in the neighbouring district of Manyema, that the river, after passing through a lake called Chebungo in the country, but to which he gave the name of Lincoln, united with the eastern branches between Kamolondo and the unvisited lakes near the equator. It does not appear that Livingstone ever saw either the Lufira or the lower arm of the Kassabi, which he names

Loéki or Lomamé, but he obtained such reliable information regarding them that we need not hesitate to lay down their respective courses on the map of Africa.

Although Livingstone seems to have believed, up to the date of our last intelligence from him, that the whole of this water system west of Tanganyika, comprising three rivers of the first magnitude, and draining upwards of 200,000 square miles of territory, found its way into the Nile, the geographers of Europe have unanimously declared against the possibility of such a connection. Not only is the bed of the Lualaba, in the Manyema country, at least 1000 feet below the bed of the Nile in the same latitude, but there are ranges of hills to the south of the head-waters of the western affluents of the Nile which completely separate the two water systems. Indeed, a river, the Uelle, has been actually crossed by Schweinfurth, in about 3° 30′ N., which descends from these mountains, and runs north-west towards Lake Chad, thus forming a definite line of division between the two systems. Many other arguments of physical geography relating to the volume of water, the rainy seasons on the equator, and the period of flood, which have been ably put together by Dr. Behm, and were read to our Society at the opening meeting of the session, may be held to prove, not only that the three-headed Lualaba cannot be the Nile, but that it must be the Congo, and an expedition is now on the way to verify by actual exploration this crowning point of African discovery.

The most important geographical feat which was achieved by Livingstone before he turned his steps to the sea coast in the spring of last year, was his journey with Mr. Stanley round the northern shores of Lake Tanganyika. Up to that time he had been firmly impressed with a conviction that Tanganyika Lake was merely an exaggerated Lualaba, being, in fact, the most easterly of the valleys which collected the drainage of the southern mountains, and carried the waters northward to form the Nile. He states, indeed, in a letter to Sir T. Maclear, that he had watched for three months "the majestic flow of the Tanganyika to the north," * and records the various details of physical evidence whereby he had been enabled to verify this northern current; so that, if he had returned from Ujiji last year direct to Unyanyembe, the passage of Tanganyika into the Albert Nyanza, and its con-

* 'Proceedings,' vol. xvii., No. I., p. 69.

sequent claim to be regarded as the true source of the Nile, would have been accepted as an ascertained geographical fact. It was most fortunate, therefore, that Mr. Stanley persuaded Livingstone, before leaving the lake, to visit its northern extremity, in order to satisfy himself by ocular observation as to its northern outflow; for on the spot the travellers found that "the Lusize River flowed in, not out, and except the small lagoon called Kivo, which too, with the river of Luanda, gives its waters into the Lusize, the natives knew of no large lake to the northward." The question of Tanganyika is thus thrown back into greater mystery than ever. It cannot be an inland sea, with no outlet, for its waters are fresh, and the explanation of annual flooding, which applies to the shallow fresh-water expanse of Lake Chad and the Lake of Seistan, is inapplicable to this deep and rock-girt basin. Where, then, is the outlet? Does the water drain off by underground tunnels through the Kabogo Mountains into the Valley of the Lualaba, or is the Rufiji, which enters the Indian Ocean between the seventh and eighth degrees of south latitude, in a delta thirty miles in width, an effluent of Tanganyika? These are questions which we cannot answer at present, but which there is every reason to expect will be solved before our next anniversary.

Our knowledge of Livingstone's present whereabouts is not very definite. He appears to have been so thoroughly impressed with a belief of the identity of his triple Lualaba with the Nile that, in spite of earnest longings to re-visit his native land, he could not persuade himself to leave Africa until he had fairly traced to their sources in the southern mountains the western branches of the great river he had explored in Manyema. Awaiting accordingly at Unyanyembé the arrival of stores and supplies, which were partly furnished by Mr. Stanley and partly by our own first Relief Expedition,—no sooner had they arrived than he started, in September last, for the southern end of Tanganyika, intending from that point to visit a certain mound, in about 11° south latitude, from whence the Lufira and Lulua were said to flow to the north, and the Leeambye and Kafué to the south. From hence he proposed to return northward to the copper-mines of Katanga, in the Koné Mountains, and afterwards he wished to explore the underground dwellings in the Kabogo Mountains, of which he had heard such an extraordinary account. Later still he was bent on visiting Lake Lincoln, and following the river which flowed out of it, and which, *under* the name of Loéki or Lomamé, joined the Lualaba a little

further down, to the great unexplored lake at the equator. His expectation seems to have been that this lake communicated with the Bahr-el-Ghazal, and that he might thus either return home by the route of the Nile, or retrace his steps to Ujiji; but if, as we hope will be the case, either one or the other of the expeditions which are now penetrating into the interior from the east and west coast respectively, should succeed in opening communications with him, before he is called on to decide on the line of his return journey from the equatorial lake, it is far from improbable that, with the new light that will be thus afforded him, he will continue his journey along the Congo, and emerge from Africa on the western coast.

I now go on to notice the various expeditions that have been organised and sent out by the Royal Geographical Society to support and supplement the explorations of Livingstone. It will be in the recollection of the Fellows that when I delivered my last Anniversary Address I was only aware that Mr. Stanley had met and relieved Livingstone, and was then on his way to England. Shortly afterwards, however, we learnt that our own relief expedition, led by Lieut. Dawson, was also returning home under circumstances which were fully reported in my November Address. It is hardly necessary, I think, to repeat the details of this unfortunate affair. Let it suffice to say that Lieut. Dawson, under a misconception of the true state of affairs, considered it to be his duty to break up his expedition at Zanzibar, without proceeding into the interior, and that accordingly he came to England with his companions during last summer, and retired from any further connection with the Geographical Society. But the Council of the Society, although thus disappointed in their first attempt to communicate with Livingstone, were not inclined to desist from further exertions in the same direction. Acting as trustees for the subscribers to the Livingstone Relief Fund, they availed themselves of the first opportunity that offered, in the deputation of Sir Bartle Frere to Zanzibar, to fit out another expedition, which should take up and carry through the duties that had been previously assigned to Lieut. Dawson. Lieut. Cameron, of the Navy, accompanied by Dr. Dillon, proceeded accordingly with Sir Bartle Frere's mission to Zanzibar during the winter, and thoroughly equipped with instruments, stores, and supplies, has now gone up from Bagamoyo to Lake Tanganyika, where he hopes to obtain some intelligence of Livingstone's movements. The party had been further strengthened, with

Sir Bartle Frere's approval, by two volunteers, Lieut. Murphy, of the Royal Engineers, and Mr. Moffat, a grandson of the well-known African missionary, and they were already *en route* into the interior at the end of the month of March, under full instructions from Sir Bartle, which would seem to provide for every possible emergency. Owing to the dissensions still prevailing between Mirambo and the Arabs, considerable difficulty had been experienced in obtaining porters for the baggage and supplies of so large a party, and as the rainy season was also just commencing, the travellers would be exposed, no doubt, to some hardship before reaching the upper country, but they were all in good spirits; and with recovered health—for Cameron and Murphy had both gone through the usual probation of intermittent fever—were prepared to carry out thoroughly and loyally the mission on which they were engaged.

Simultaneously with these proceedings we have been organising an independent expedition, which it is intended should proceed up the Congo, in order to reach the great equatorial lakes, and thus afford Livingstone an easy means of retiring to the West Coast, should he also succeed in reaching the same point, by descending, as he proposed, from Lake Lincoln through the Lomamé and Lualaba rivers. Mr. Young, of Kelly, Livingstone's great friend and patron, was so impressed with the feeling that this exploration of the Congo offered the most hopeful means of access to Livingstone in the centre of the African continent, that he generously supplied funds for the expenses of the expedition to the amount of 2000*l*., and Lieut. Grandy, of the Navy, is now accordingly on his way from St. Paul de Loanda into the interior, accompanied by a strong party of Kroomen from Sierra Leone, and furnished with supplies, sufficient not only for their own party, but destined also to relieve the wants of Livingstone, if he should be met with on the upper river. Lieut. Grandy will strike the Congo above the rapids that were visited by Tuckey, and will from thence proceed on a track that has never before been visited by a European, though well known to the native traders, along this mighty river to the lake from which it is reported to issue forth, and which is supposed to be identical, or at any rate immediately connected, with the lake into which the Lualaba disembogues. Lieut. Grandy has been most generously treated by the Colonial Government of Sierra Leone, through its enlightened chief, Governor Hennessy, who is himself an ardent geographer and takes the greatest interest in African discovery; and the Portuguese

authorities also, at St. Paul de Loanda, have further rendered every assistance in their power.

I shall close this brief notice of the Livingstone Relief Expeditions by referring to our resolution of last autumn, which awarded our gold medal to Mr. Stanley for the services rendered by him to geography in relieving Livingstone at Ujiji, and bringing the great traveller's journals and papers to England. The full value of this service will not be recognised till Livingstone's observations are worked out and his route is duly laid down upon the map of Africa; but we know enough to feel assured that the recent discoveries in Central Africa are not inferior in interest to those formerly achieved by our great traveller in the southern part of the continent, and that Mr. Stanley is thus entitled to the gratitude of all geographers for having rescued and brought to Europe such important materials.

Baker's Upper Nile Expedition.—The movements of Sir Samuel Baker upon the Nile have been watched with so much interest by the public, and the anxiety as to his present condition is so general and so profound, that, although his employment in Egypt is in no way connected with the Geographical Society, I still think I am only doing my duty in supplementing last year's report with such further particulars regarding him as have since come to hand. The fullest and most trustworthy account, then, which has been received of the expedition since it reached Gondokoro, in October, 1871, is contained in the following letter, which was furnished by the correspondent of the 'New York Herald' at Khartoom, and was duly published in America in last December.

"On the 7th day of November the merchant fleet reached here, comprising ten sail, owned by Mohammed Akad, who is the sole proprietor of the ivory establishment situated south of Gondokoro. The expedition brought tidings from Sir Samuel Baker that you will perhaps regard as more precious than ivory. Baker himself has not written a line either to Europe or to the Egyptian Government so far as I can learn. I, therefore, can only report what I have patiently gathered from the men who have seen Baker in the equatorial regions. Although they come direct from there and from association with him, the reports must, until further advices, be received with a certain degree of caution.

"When Sir Samuel Baker took his departure from Khartoom in January, 1870, he entered into a contract with the Sheikh Mohammed-el-Akad, stipulating that the exploration between Gondokoro and the Albert Nyanza should be undertaken on joint account, the proceeds realised from the sale of ivory to be divided in the ratio of the number of men furnished by either of the contracting parties. Akad agreed to furnish men for transportation purposes, and to furnish the necessary provisions for Baker's soldiers. Akad's portion of

the expedition was placed under the command of his son-in-law and partner, Abu Saut. But before the expedition had even reached Gondokoro, dissensions arose. The Bari—negroes employed as carriers—revolted and ran away, thus leaving the expedition without the necessary transportation. Baker accused Abu Saut of complicity in the desertion of the negroes, and favouring and encouraging that dissatisfaction among them that led to the desertion. Abu Saut is certainly a great favourite with the negroes, and much respected by them; but this is hardly sufficient reason for supposing that he would provoke revolt to his own injury.

"On Abu Saut's arrival at Gondokoro, Baker would not permit him to unload his boats at the bank of the river, but compelled him to confine himself to an island at the opposite side. Time, however, was pressing. The Egyptian troops, with Baker, had been already detained several months, and now with an open quarrel on foot, the only prospect was one of indefinite delay. In this position Baker found himself forced to make what use he could of Abu Saut's influence in the country, and through him negotiated for a new party of negro carriers. He was thus enabled to proceed towards the equator with 200 soldiers, leaving the remainder of his forces and all his baggage at Gondokoro under command of Col. Rauf Bey.

"For several years past Akad has been in possession of several trading stations in the equatorial regions—namely, at

"1. Farschelé, in the district of Medi, six days' march from Gondokoro.

"2. Falóro, three days' march from Farschelé (see Map).

"3. Fabo, eight hours south of Falóro (see Map).

"4. Fatuka, in the district of Fadjuli, eight hours east of Fabo. (On Baker's map it is called Fatiko.)

"5. Fauér (Fauira on Baker's map), situated on the Bahr Magango (the Nile), in the district of the Faloa tribes, four days from Fatuka.

"6. Musindi, residence of King Kamrasi, five days south of the river Magango.

"All these establishments had to be inspected by Abu Saut, and therefore he went on ahead of Baker, and visited Musindi, where he found that Kamrasi had died, and was succeeded by his son Kabrega. The latter proved an old acquaintance of Abu Saut, who was therefore received with much consideration. Kamrasi's tribe is of a higher state of culture than the negroes of northern tribes. Nakedness is prohibited—all are clothed. The residence of the king is highly ornamented. The roof rests on ivory pillars, the walls are covered with silken and woollen stuffs, and the floors well carpeted. These luxuries are provided by traders from Zanzibar, who have a station three days' journey south of Musindi, situated in the district of Magango, the chief of which is Kamrasi (?). The proprietor of this trading station is Isa Mansur, who, like all his companions, believes in Islam. He can command 800 muskets. The traders of the Indian Ocean and the ivory traders of Central Africa meet each other at Musindi, and from this point there is four days' journey in a western direction to the Albert Nyanza. In this district Abu Saut has been in the habit of annually bargaining for about 500 cantars of elephants' teeth, and during this season has returned, as usual, with a large cargo to the station at Fabo.

"Baker arrived at Musindi subsequently to Abu Saut's visit, and doubtless there had been reference to Baker in the conversation of Abu Saut with Kabrega, the king, for the latter was informed of Baker's coming and of his purposes. He remained quiet, but jealously watched the movements of the expedition. The goods which Baker brought with him were unpacked and exhibited in his tents. The natives, invited by Baker, came to exchange ivory for the goods. In a short time small quantities of elephant tusks had thus been bartered for. The natives were much surprised that Baker—

who, on his first visit, was satisfied to live, as they did, on 'melochies,' a wild-growing vegetable, simply boiled in water—now bore the dignity of a Pacha. The notion of the natives, it should be remembered, is that there exists no greater king than either Kabrega or Kamrasi.

"One day King Kabrega regaled the Egyptian soldiers with a drink called 'merissa' (a beverage distilled of corn). All drank, and drank to excess. The men fell sick and fainted, the symptoms appearing dangerous. Remedies were promptly applied, and fatal consequences averted. The 'accident' had been caused by one of Kabrega's courtiers, and Baker, highly incensed, demanded the culprit to be handed over to him. This was refused, whereupon Baker ordered a bimbashi (that is, a captain) to go, accompanied by two soldiers, to fetch the culprit, if necessary, by force. Now, a negro never permits force to be used without taking revenge. When the soldiers came to fetch the courtier, they were attacked by the natives and all three were killed. This, of course, was the signal for a general attack. Baker declared war, and on both sides the fire was opened. The issue did not remain doubtful very long. Kabrega, in addition to an army of Lancers, has 200 muskets. Thirty soldiers fell, and Baker was compelled to give way. He retired before an overwhelming force, leaving arms and munition, as well as the ivory, tents, and all he possessed, to be consumed by fire, in order to prevent their falling into the hands of the enemy. In his retrogade movement Baker was pursued and harassed during five days, until he reached the River Magango. Arriving there he remained twelve days before he was enabled to cross the river, no ferry or boats being procurable. Baker attributes this disaster to the intrigues of Abu Saut.

"At Fatuka there is the largest trading establishment owned by Akad, and here Baker demanded that the servants, under whose protection rested Akad's establishment, should henceforth take allegiance to the Egyptian Government, the contract with Abu Saut having expired. The districts over which Abu Saut traded must be thrown open, and Baker Pacha sent for the Vakil of the Seriba (chief of the station), named Weled-el-Melik, 'son of the king.' This person sent two of his men to apologize for his non-appearance, owing to sickness, and to take the orders of the Pacha. This circumstance confirmed Baker's suspicion of an intended obstinacy on the part of the Turkish Rajah (?), and of a refusal to obey orders. A tumult ensued. The negroes belonging to Baker's expedition joined in the *mêlée*, and attacked, subsequently, the Seriba of Akad. Before the men of the latter could take means of defence, several persons were killed. The Danagla (men of Dongola) took to arms, and fired on the coloured men. Baker's forces opened fire on the traders, who, following the orders of their chief, did not fire on the Egyptians, but retired. About 130 men, Berbers and Danaglas, fell in the fight. The trading station has been taken possession of by Baker, with all the goods, munition, stores, and also 300 donkeys.

"Abu Saut, who during the occurrence was at Fabo, has received from Baker a letter stating that the Danaglas provoked the fight, and that he was thus compelled to punish them. When Abu Saut reached Fatuka endeavours were made to induce him to acknowledge the fact that the responsibility of the occurrence rested on the trading association. This he refused, believing that the evidence given by his own men proved the contrary. Baker Pacha was, in consequence, induced to call in the man Weled-el-Melik, and to instal him as chief of the entire trading establishment. A circular was sent to the other branches, and the forces were ordered to swear allegiance to the Egyptian Government, and to serve it henceforth. The Nubians held councils among each other, and informed the Pacha in writing that they remained loyal to their former master, and that force would be met by force.

"Under these circumstances Abu Saut resolved to abandon the country,

and to return to Khartoom. Owing to the warlike preparations he was unable to secure men for the transportation of the 1000 cantars of ivory, which he left behind at the Seriba of Fabo. The 400 men left in charge have received orders not to fight in case of an attack being made by the Pacha, but simply to abandon the Seriba and the ivory, to take to the boats, and return to Gondokoro.

"The trading enterprise of Akad is thus interfered with, and Abu Saut proposes to go to Egypt, with the view of personally reporting to the Khedive.

"Regarding Sir Samuel Baker, whose contract expires very soon, we can form no idea. Whether he will renew the expedition, or whether he closes his mission at Fatuka, and returns *viâ* Gondokoro and Khartoom, all is conjecture. In the mean time Mr. Higginbottam, the engineer, has mounted the movable steamer destined to explore the Albert Nyanza. Mechanics and machinists have been busied at Gondokoro, and we conclude that operations will now commence."

This letter is penned in a spirit evidently not favourable to Sir Samuel Baker, and its statements, therefore, coloured as they are, must be received with some reserve; but there is no reason to question the accuracy of the geographical details, in so far as they concern the movements of our countryman upon the Upper Nile. Baker has not penetrated further south, it would seem, on this expedition than about 1° 30′ of north latitude, nor has he been able to re-visit the western lake which he discovered on his previous journey. The statement, at the same time—if it is to be so understood—that the steamer has been put together at Gondokoro, is very puzzling; for it would be impossible to take the vessel up the cataracts and rapids south of that point, so as to launch it on the lake; and the great object of the expedition, as far as geographical discovery is concerned, would thus seem to have been given up. In regard to the all-important question of Baker's personal safety at the present time, it is satisfactory to know that a succouring party of several hundred men, under the military Governor of the Soudan, left Khartoom during the winter, and had arrived at Gondokoro by the 15th of March; so that there is every prospect of our countryman being soon extricated from his dangerous position at Fatuka, even supposing—which is hardly probable — that Mr. Higginbottam has not at an earlier period brought up reinforcements to his relief. I take this opportunity of further announcing—what is not generally known—that Sir Samuel Baker's engagement with His Highness the Khediveh terminated at the close of last year; and that the American officer, Colonel Purdey, who was reported to be charged with the duty of leading a relief party from the east coast of Africa by Kilima-Njaro and the Baringo Lake to the country of Kamrasi, has been, in reality, entertained with a view of succeeding to the

command of the expedition on Baker's retirement. Colonel Purdey's party, which is said to be efficient and well equipped, is still, however, detained at Cairo, the idea of its entry into the Upper Nile basin from the east coast having been definitely abandoned, while its journey to Khartoom and Gondokoro, either now or later in the year, is dependent on the intelligence that may in the mean time arrive from the upper country.

Conclusion.—It remains, gentlemen, that I should now say a few words on my retirement from the honourable position to which you elected me two years ago, and the duties of which I have ever since endeavoured to discharge to the best of my judgment and ability. To say that these duties are not sometimes onerous, and even painful, would not be true. Undoubtedly they involve very considerable labour and no small share of responsibility. It is impossible, indeed, for your President to conduct the affairs of a Society numbering 2700 Fellows, however cordially and efficiently he may be supported by his Council and Executive Staff, without occasionally being guilty of saying, or not saying, something that gives offence, and thus reacts unpleasantly on himself; but, at the same time, the office of President of the Royal Geographical Society is one both of honour and of power; and affording as it does the means of adding both to the knowledge and happiness of mankind, it must ever be an object of ambition to those who take an interest either in the promotion of science or the conduct of public affairs.

The rules of the Society, at the same time, have hitherto prescribed that the President shall only hold office for two years, and shall not be eligible for immediate reappointment, and although in the case of our late President Sir Robert Murchison, who was so specially fitted for the position both on scientific and on social grounds, the rule was habitually violated, still it was felt by myself and by the Council that our laws could not be disregarded in the case of another President not similarly circumstanced, without to a certain extent discrediting our Institution, and I prepared accordingly some months ago to resign my functions at the Anniversary Meeting into the hands of a successor. I must also, to avoid misconception, state that the Council were kind enough, notwithstanding the manifest inconvenience of such a course, to propose again to suspend the law in my favour—and prospectively the restriction has now been actually removed by your vote of this morning—but after three years' experience I had found the demands upon my

time and attention which the conduct of your affairs imposed upon me to be so excessive as to interfere seriously with my other necessary occupations; and I have therefore judged it absolutely indispensable to solicit an interval of relaxation. In accordance, then, with the law, and with my own wishes repeatedly expressed, the Council proceeded to consider the somewhat difficult question of appointing another President, and their choice fell upon Sir Bartle Frere, who has already on many occasions presided over our meetings, and who has every qualification necessary for permanently holding the high office in question, if you should be pleased by your votes to sanction the recommendation of the Council. Sir Bartle Frere has been already communicated with upon the subject, and although his views cannot be known for another week or ten days, when his arrival is expected in England, still there is no reason to anticipate that he will be disinclined to accept of so honourable an office; and in the mean time—that is, pending his decision—I am prepared to continue to watch over your interests. With my best thanks, then, for the support which the Fellows have always afforded me, I now take leave of you as President, and ask your indulgent consideration of any shortcomings you may have observed during my tenure of office.

Postscript.—As these sheets are passing through the press, we learn by a telegram from Alexandria that Sir S. Baker, with his wife and nephew, arrived at Khartoom from Gondokoro on the 29th of June, having succeeded in suppressing the slave trade on the Upper Nile, and having brought under the authority of the Egyptian Government the country east of the Albert Nyanza to within 4° of the equator. The most interesting piece of geographical intelligence which is contained in this telegram, and which is said to be given on the authority of Sir S. Baker himself, is that, after all, the Albert Nyanza and Lake Tanganyika are one and the same body of water; a vessel launched on the river above the Murchison Falls being capable of passing direct by Baker's Lake to Ujiji on the eastern side of Tanganyika, a distance of over 700 miles. This, however, is so entirely opposed to the results obtained by the personal observations of Stanley and Livingstone, that, pending its confirmation by Sir S. Baker, and a full explanation of the grounds upon which he has come to such a conclusion, I cannot recommend the statement to the acceptance of geographers.

July 10, 1873.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[PUBLISHED SEPTEMBER 26TH, 1873.]

SESSION 1872-73.

Thirteenth Meeting, June 9th, 1873.

SIR RUTHERFORD ALCOCK, K.C.B., VICE-PRESIDENT, in the Chair.

ELECTIONS.—*Sir William Bagge, Bart.*, M.P.; *John Dodd, Esq.; W. Stuart Elmslie, Esq.; Rev. James Aubrey Gould; John Hunt, Esq.; Dr. Edward Hepburn Seccomb; Captain Cyril Sharp* (26th Cameronians); *A. J. R. Stewart, Esq.*

ACCESSIONS TO THE LIBRARY FROM MAY 12TH TO JUNE 9TH, 1873. —'Nuova Italia.' By Nomentino (J. McCosh, F.R.G.S.). 1873. Donor the author. 'The Complete Works of Count Rumford.' By G. E. Ellis. 2 vols. Boston. 'On the Rise of the Land in Scandinavia.' By S. A. Sexe. Christiania, 1873. Donor the author. 'On the Agricultural Geology of the Weald.' By William Topley. 1872. Donor the author. 'Practical Sailing Directions and Coasting Guide from Sand Head to Rangoon, &c.' By Capt. N. Heckford, I.N. 1871. Donor the author. 'The Cruise of the *Rosario*.' By A. H. Markham. 1873. Donor the author. 'Canoe Travelling (Baltic).' By H. W. Baden-Powell. 1871. Donor the author. 'On the Curve of Denudation, &c.' By A. Tylor. 1872. Donor the author. 'Les Richesses Naturelles du Globe.' Par M. Bernardin. Paris, 1873. Donor the author. 'Sailing Directions for the Indian Archipelago, &c.' By A. G. Findlay. 1870. 'Sailing Directory for the Mediterranean Sea.' 1868. 'Description and List of the Light-Houses of the World.' 1873. 'Directory for the Navigation of the North Pacific Ocean.' 1870. 'Directory for the South Pacific.' 1871. 'Memoir of the Northern Atlantic Ocean.' 1873. 'Memoir of the Southern Atlantic Ocean.' 1872. 'Sailing Directory

for the Indian Ocean.' 1870. Donor A. G. Findlay, Esq. 'A Revised Catalogue of the Birds of China, &c.' By R. Swinhoe, 1871. Donor the author. Bronze Medallion of Captain Franklin, R.N., by David. 1820. Donor Dr. Gray.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MAY 12TH, 1873.—Maps and Atlases of Russia in Europe and Asia, in Russian characters, viz.:—Map of Central Asia, on 4 sheets, published at St. Petersburg. Scale, $\frac{1}{4200000}$; Topographical Map of the Mining Districts of the Altai, Central Asia, on 23 sheets. Scale, $\frac{1}{420000}$; Atlas of a part of the River Dnieper, from the Town of Krementchuga to Limana, on 35 sheets; Atlas of part of the Northern Dvina River from Ustivgvel to Archangel, on 46 sheets; and same on larger scale. Part I., on 27 sheets, Atlas of the River Volga; various parts of ditto, on 50 sheets; the same on enlarged scale, on 26 sheets. By purchase. MS. Drawing of a Portion of the Runn of Cutch. Scale, 1 inch = 200 yards. Sketch-map of India, showing the Lines of Railway and Electric Telegraph, on 1 sheet. Scale, 1 inch = 70 miles. Through Mr. H. W. Bates. Wyld's Map of Khiva and the Surrounding Country, on 1 sheet. Scale, 1 inch = 50 miles. Presented by the author. Australia:—A Map of the Country west of the Telegraph-line, showing the newly-discovered Lake of Amadeus. By Mr. E. Giles; and his track to the same, in 1872. Presented by Baron F. von Mueller, M.D., F.R.S. Maps of Belgium, on 154 sheets; the Government Survey on various scales. By purchase. Australia.—Map of the Discoveries of E. Giles, Esq., showing Lake Amadeus, &c. Presented by Guido Cora, Esq. Map of Khiva, photo-zincographed under the superintendence of Lieutenant-Colonel Parsons, R.E. Office at Southampton. Presented through Captain C. W. Wilson, R.E.

The following paper was then read by the Author:—

The Site of the Lost Colony of Greenland determined, and pre-Columbian Discoveries of America confirmed. By R. H. MAJOR, Esq., Secretary R.G.S.

[ABSTRACT.]

IN this paper Mr. Major vindicated the authenticity of the voyages of the two Venetian brothers Nicoló and Antonio Zeno to the Northern Seas at the close of the fourteenth century. About the year 1389, Nicoló Zeno, a member of one of the noblest and most ancient families of Venice, having ample means, went at his own expense on a voyage of curiosity to the North. He was wrecked on the Feroe Islands, but fortunately fell in with Henry Sinclair, Earl of Orkney and

Caithness, who took him into his service as pilot of his fleet. After a year or two, Nicoló Zeno sent a letter to his brother Antonio, inviting him to join him, which he did; and it is from that letter of Nicoló's, and subsequent letters from Antonio to a third brother Carlo, that the narrative of the movements of the two brothers is derived. The story, as we have it, comprises, in the first instance, some insignificant expeditions in the Feroe and Shetland groups; but fortunately treats more fully of two much more important subjects, viz., a visit by Nicoló Zeno to Greenland, and a communication by Antonio Zeno of the report of some fishermen who had discovered some populous countries in the west, which were beyond all question North America.

An account of these voyages had been written by Antonio, but a descendant of his, named Nicoló, had when a boy, from ignorance of its importance, torn it up. Fortunately some letters of the two brothers survived, and in later years Nicoló Zeno, junior, who by that time had become a member of the Council of Ten in the Venetian Republic, realising the mischief he had done in his youth, brought these letters together into a narrative and published it in Venice in 1558. He also found in the palace a map made by his ancestors, which had become rotten with age and damp, of which he made a copy, but unfortunately added to it his own geographical conclusions from the reading of the letters, and, in so doing, vitiated in a most deplorable manner a precious document, which, even at that comparatively late period, was far in advance of the existing state of geographical knowledge. So serious was the effect of his unfortunate mistake, that it misled geographers who had at that time no means of correcting the errors thus placed before them, and, when the knowledge of the geography of the North advanced, the map exhibited so many deviations from accuracy, that great discredit was thrown both upon it and upon the narrative. At length, in 1836, Captain Zahrtmann, the hydrographer of the Danish Navy, wrote a learned and elaborate paper to show that the whole story was a "tissue of fiction." This was printed in the fifth volume of the 'Journal of the Royal Geographical Society.' As, however, side by side with the gross errors of the map, there existed information of the most surprising kind in accordance with recent geographical discoveries, especially in the delineation of the continent of Greenland, there still remained some who held their judgment in suspense, and the document remained simply, as the learned John Pinkerton has described it, "one of the greatest puzzles in the whole circle of literature." The truth was, that no one had as yet realised what Mr. Major here called attention to, viz., the ignorant but per-

fectly honest intermeddling of Nicoló Zeno, the younger, with the valuable map which had come down to him from his ancestors. Mr. Major clears up this puzzle by new but very simple processes of reasoning, and converts the very faults of the map into an unanswerable proof of the authenticity of the old narrative. It seems never before to have struck any one that the names of places in the North were received by the old Venetian navigator from the lips of Northern men, and written down by him in such fashion as the sounds would suggest to his Southern ears and mode of writing. In endeavouring to fix the localities thus represented, commentators have fallen into the egregious blunder of taking the names literatim as they were written down, and then searching in the Northern seas for places like them in their written form; whereas the common-sense process is to follow strictly the narrative, and see what names of places on the route tally in *sound* with those which have been written down. By observing this rule Mr. Major has succeeded in tracing, in accordance with modern geography, all the places visited by the old traveller, in conformity with the bearings given in the narrative. This circumstance, combined with the fact that the map, reconstructed by Nicoló Zeno, junior, is often grossly at variance with the correct geography of the text, proves to demonstration that the narrative could not by any possibility have been a concoction of his own, but must have come into his hands from a true and genuine source; for, as the narrative and the map were both first given to the world by him, and as the spelling of the names are alike in both, it is clear that the man who could so grossly misrepresent on a map the geography of the text could never have been the author of a narrative, the geographical accuracy of which bears the test of comparison with accurate maps of modern times. It is, on the same grounds, equally clear that the discrepancies have arisen from his own misreading of the narrative in an honest intention to make the map as useful as he could. The distorted spelling of the names is another proof that they were derived from personal intercourse with the Northerners; for, if Nicoló Zeno had taken them from either MS. or printed Northern sources, the names would naturally have been copied by him in their Northern form. Mr. Major did not, however, content himself with vindicating the truth of these voyages by internal evidence alone. In Nicoló Zeno senior's visit to Greenland there is a very interesting description of a monastery dedicated to St. Thomas, the cells of which were heated from a natural spring of hot water, which was also used by the monks for dressing their meat and baking their bread. The monks had likewise gardens covered over in the winter time and warmed

by the same means, so that they were able to produce flowers, and fruits and herbs, the same as if they lived in a temperate climate. Many other advantages are described as accruing to the monks from their judicious employment of this hot water. In corroboration of this fact, and its valuable bearing on that much-vexed question the site of the lost Scandinavian colony in Greenland, Mr. Major has adduced the testimony of a Greenlander, named Ivar Bardsen, who in the fourteenth century was steward to the Bishopric of Garda, in the East Bygd, that portion of the colony the site of which has been so much disputed. Ivar Bardsen has left sailing directions for reaching the colony from Iceland, and has also given us a detailed topography of the country. The credibility of this valuable document has also been impugned, and for the following reason. The sailing directions say that a course due west from Iceland will bring a ship to some large rocks, called Gunnbjorn's Skerries, which had become so clogged with the ice that had come down from the north, that the sailor must then take a south-west course to clear the ice, after which a tack to the north-west would bring him to the colony. As, however, no one of late years could find these rocks, discredit has been thrown upon the entire document. Mr. Major has reinstated the credit of Ivar Bardsen by a discovery of his own. In the 1507 edition of Ptolemy is a map by one Johann Ruysch, in which, lying midway between Iceland and Greenland, as indicated by Bardsen, is an island against which stands the following legend:—"Insula hæc anno Domini 1456 fuit totaliter combusta;" and, further, Mr. Major has found on Dutch maps, of about the year 1700, the reef produced by this volcanic upheaval, laid down as about 60 miles long by some 25 broad, and bearing the name of Gombar Scheer, a manifest synonym for Gunnbjorn's Skerries. There are soundings at 25 fathoms at the north and south ends of the reef, the nearest soundings further north being from 70 to 100 fathoms. The validity of Ivar Bardsen's sailing directions being thus re-established, Mr. Major proceeded to show the value of his chorography. By the sailing directions referred to, Bardsen brings us to a promontory called Hvarf, which means a "turning point." From this point eastward he leads us by three great leaps along vast ranges of uninhabited coast, until we come to a part where we can go no farther for the ice and snow. He then returns to Hvarf, and proceeds westwards to specify the various fjords and sites of churches in the East Bygd, the names of which are distinctly recognisable from the Sagas and the other chorographies; but, as he approaches the end of his enumeration of the localities, it is observable that he says "further north" is such a place, yet "further north" is such another

place, and so on till you come to the end of the East Bygd. Mr. Major here pointed out for the first time, that, in this case, we have an unanswerable demonstration of the true site of the long lost East Bygd; for, since eastwards from Hvarf leads to the north, where you can go no further for the ice and snow, and westwards from Hvarf leads to places which are yet "more north," and still "more north," it follows of necessity that Hvarf must be a point in the south of Greenland, and that the East Bygd lies immediately to the west of it—*i. e.* on the south-west coast of Greenland. This result being gained, Mr. Major showed how Ivar Bardsen corroborated Zeno. After mentioning a monastery dedicated to St. Olaus, he says that in a neighbouring fjord are some small islands abounding in hot water. These are, no doubt, the hot springs of Ounartok, near which some remains of the buildings of the old colonists have been found, and Mr. Major has ascertained from Dr. Rink, the late Inspector of South Greenland, that there are no other hot springs, to his knowledge, in the district of Julianashaab, which is now definitely proved to be the site of the ancient colony. The position of Ounartok coincides admirably with the site of the monastery in Ivar Bardsen's chorography, and this point being established may serve as a basis for tracing the topography of the entire colony. The difference between the names of St. Olaus and St. Thomas given by Zeno and Ivar Bardsen to the same monastery is easily explainable, for the strange northern name of St. Olaus would sound to the southern ear of the Venetian very like St. Thomas. But not only does Bardsen corroborate Zeno, but Zeno corroborates Bardsen. On the remarkable delineation of Greenland in the Zeno map we find laid down, in the position corresponding with Bardsen's Hvarf, the promontory of "Avorf," which is, doubtless, the Southerner's mode of rendering the Northern word. Antonio Zeno remained in the service of Earl Sinclair ten years after the death of his brother Nicoló, and the most interesting fact which survives to us, as coming from him, is the report of some fishermen who had discovered some populous countries to the west, which were, beyond all question, North America. They found Latin books in the possession of one of the chiefs; but these were no longer understood. The people made beer, which was "a kind of drink that North people take as we do wine." Their foreign intercourse was with Greenland, whence they imported furs, brimstone, and pitch. All this is in harmony with what we know of the Scandinavian settlements in North America in pre-Columbian times, and the fishermen's report is a simple résumé of the knowledge acquired by the Northmen in their expeditions to the west and south-west.

It was in the year 1001 that North America was discovered by Lief, son of Eric the Red. The tracts of country then discovered were called Helluland, *i. e.* Slate Land, supposed to be Newfoundland; Markland, *i. e.* Woodland, supposed to be Nova Scotia; and Vinland or Vineland. There is much uncertainty about the two former, but the site of Vinland is less problematical; for, as we learn from one of the old writers that the length of the day was nine hours, it gives us the latitude of 41°; and whereas the name was given by the old discoverers from finding the vine growing wild there, the more recent English discoverers, for the same reason, but quite independently, gave the name of Martha's Vineyard to the large island close off the coast, in lat. 41° 23′.

There is one locality on the Zeno map which has given rise to great perplexity. It is a large island called Icaria, lying where certainly no island exists, at an equal distance between Iceland, Frisland, or the Feroe Islands, and Estotiland, supposed to be Newfoundland. Many writers have imagined it to be some part of America, but Johann Reinhold Forster was the first to suggest that it meant Kerry, and Mr. Major proved that he was right, although by reasonings that Forster had not adduced.

An expedition was organised by Earl Sinclair for the verification of the fishermen's story, but, after leaving the Feroe Islands for the west, and when well out at sea, they were driven they knew not whither, by a storm which lasted eight days. After the storm abated they discovered what is described in the original Italian as "da Ponente terra." Now this expression is susceptible of two renderings—either that they came "upon an island to the westward," or "upon an island on its western side;" but as, when repulsed by the natives, they sailed round about the island and came into a harbour on its eastern side, it is manifest that the harbour which they first entered was on the west, and in a position corresponding exactly with Kerry in Ireland. This peculiar point of arrival, and the name Icaria, which at that place they were told was the name of the country, the conduct of the natives, who would not allow them to land, and who, as the fleet made its way northwards along the east coast of the island, pursued it along the hill-tops and howled the strangers off the shore, all go to show that Kerry and Icaria are identical. After leaving the north point of the island the fleet sailed six days to the westward without seeing land—a fact which accords with the situation of Ireland, but not with any part of America, or any other country otherwise answering the conditions. The anomalous position of the island on the map, whether due to Antonio Zeno or to the handiwork of his descendant Nicoló

Zeno in touching up the map, is easily explained by the entire ignorance of the former as to where the fleet was after being beaten about for eight days by the storm. With this episode, and the return of the remnant of the fleet to Frisland, the Zeno narrative virtually concludes. The many riddles which it embodies have, at length, as Mr. Major claims, met with a complete solution; and if the realities which he has detected had been made clear to people's minds, as they easily might have been, three hundred years ago, Martin Frobisher would have avoided the blunder of taking Greenland for Zeno's Frisland, which meant the Feroe Islands; a host of learned commentators during that period would have been saved from confusing themselves and others by wild speculations; the site of the lost Greenland colony would have been established long ago on the highest possible authority; the kings of Denmark, from Frederic II. downwards, would have been spared the necessity of sending out a great number of unsuccessful expeditions; many an elaborate work, from the pens of some of the most illustrious literati in Europe, would have been rendered superfluous; and the name of a noble gentleman, occupying the exalted position of one of the Council of Ten in the Republic of Venice, would have been protected from the unwarrantable and infamous charge of being guilty of falsehood and forgery.

The paper will be published *in extenso* in the 'Journal' of the Society.

The PRESIDENT said the paper, notwithstanding its length, was only an abridgment of the results of very extensive and important geographical research. It required serious study to master all the details and facts connected with the discovery of Greenland, which linked itself to some of the most interesting pages of history. One of the principal reflections suggested by Mr. Major's paper was the important part which accident, blind chance, and circumstances of the most trivial and apparently most fortuitous kind, seemed to have played in the history of mankind in the discovery of unknown lands. It was now known that the discovery of North America was really made in the tenth century, by a Norwegian; but, to all intents, for the following six hundred years the knowledge of the continent, which has recently had such powerful influence on the destinies of Europe, was lost to the world. The discovery of Japan and other countries was also remarkable for the apparent insignificance of the facts which led to it. It was necessary, in historical investigations of this kind, to enter into many details; but they all had an important bearing upon the history of the human race. He trusted that some of the members present would be good enough to supply, from personal knowledge, valuable information concerning Greenland, Iceland, and those regions.

Admiral Sir GEORGE BACK said he was not prepared to speak on a subject, a thorough knowledge of which required such great research. The late Sir John Barrow (the very source of modern Polar discovery) had referred to the lost colonies of Greenland in an able work which he had published a long time ago. There were two colonies, and the western one indicated by Mr. Major was actually seen by that good man Hans Egede in 1721. The eastern one,

established by Eric Raude in 983, prospered so much as to include nine or ten parishes, a bishop's see, and two monasteries. According to the Icelandic records sixteen bishops succeeded each other, and when the seventeenth was sent out, the coast of Greenland was unapproachable, on account of the vast quantities of ice, and he was obliged to return to Norway. Several subsequent efforts had been made to reach the land, and lastly by the well-known scientific sailor Scoresby, who, however, was unable to accomplish his object. Geographers must thank Mr. Major for having finally settled a long-disputed point.

Mr. BRADFORD said he went some 200 miles out of his course to the locality which had been described by Mr. Major. If it had occurred to him sooner, he would have brought to the meeting some views illustrative of the various points, and giving a very correct idea of the ruin referred to. There was a cathedral, he thought, about 40 feet long and 25 to 30 feet wide, which was in a very good state of preservation. At the farther end the arch of the window was still very perfect. The door at the entrance was also perfect, and all the windows more or less so. There were some six dwelling-houses, and the whole was surrounded by a wall, which might be seen and traced at the present day. It was situated at the base of a cliff from 75 to 100 feet high. Above that there was a level plateau of 300 or 400 feet; and then mountains, some 2000 feet in height, rose abruptly. In reply to a question by a member of the Society as to whether there were any hot springs, the speaker said he had searched very carefully for hot springs, and sent some twenty or more men in all directions, but they could find nothing of the sort.

Admiral SHERARD OSBORN said he only professed to have seen the south coast about Cape Farewell at a distance, but, trending as it did for many miles in an east and west direction, it was natural for the old Norsemen to speak of the settlements as being respectively East Bygd and West Bygd. He believed Mr. Major had as near as possible solved the question regarding the position of the old colony. He should like to know whether Mr. Major had discovered references to the voyages made by the ancient voyagers as high as Upernavik in Baffin Bay. As high as 74° N., opposite the entrance of Barrow Straits, an old Runic stone was discovered, which was exhibited in Copenhagen at this day. It was a wonderful feat for those men to accomplish. He could not help being struck with the resemblance of the map exhibited on the wall —(the younger Zeno's map)—to the maps of the present day of Greenland. If the land and mountains were turned in the right direction the resemblance would be perfect. This showed that it could not have been drawn merely from his imagination, but that it must have been taken from an old map which he had in his possession. The members of the Society were deeply indebted, as geographers, to Mr. Major for his paper.

Dr. WALLICH said that Mr. Major had alluded to the Gunnbjorn's Skerries, and had stated that the position assigned to these rocks in Ivar Bardsen's 'Sailing Directions' (namely, to the south-westward and midway in navigating between Iceland and Greenland) was confirmed by the account of the two Zenos, and would show these Skerries to have been neither more nor less than the island which, according to Ruysch's map in the 1508 edition of Ptolemy, is denoted as having been totally destroyed by volcanic action in 1456. Now, as the correct determination of the position of these Skerries was of the highest importance, not only as regarded the confirmation or otherwise of the account of the Zenos, but also as bearing on the hydrography of this portion of the North Atlantic, he begged leave to offer a few remarks on the subject. In 1860 he had the honour of taking part in the expedition, on board H.M.S. *Bulldog*, under command of Sir Leopold McClintock, which was sent to take soundings across the North Atlantic. He could confidently affirm that no trace of shoal water occurred in the course that would be traversed by a vessel sailing direct

from Iceland to the south-east point of Greenland. On the contrary, the soundings, which were numerous and most accurately taken, proved the existence of deep water along the entire mid-route between Iceland and Greenland, varying in depth, in round numbers, from 1000 to 1500 fathoms, without a trace of volcanic matter so far to the westward. He would point out, however, that, in many of the older charts, a shoal or sunk land was laid down at a point considerably to the southward of the position which Mr. Major had assigned as the correct one for the Gunnbjorns Skerries, and that in these maps it had gone by the name of the "Sunken Land of Bus," and occasionally that of "West Friesland." He was well aware that the existence of this sunk land had been generally regarded as mythical, and would particularly observe that in the account he published in 1862 of the voyage of the *Bulldog*, whilst entering somewhat fully into all the older accounts of these regions, he neither conveyed nor intended to convey the idea that any island, or exposed surface of land, had, within the memory of man, been observed in the locality referred to, namely, about lat. 58° N. and long. 29° or 30° W. As none of the maps exhibited at the meeting had the latitudes and longitudes laid down, it was impossible to convey a proper idea of the points indicated. All he attempted to establish was, the existence, in the neighbourhood of this region, of comparatively shoal water, and that, too, precisely where it was to be expected that the greatest depths would show themselves. He would also notice, incidentally, that both Krantz and Graah (from whose works he quoted the statement in his volume) discredited the existence of the Gunnbjorns Skerries midway between Iceland and Greenland; and that Graah suggested that "Friesland" was identical with "Bus," and stated that, according to some persons, "this island was swallowed up by an earthquake." He would take the liberty of stating his own reasons why the sunk island of Bus was not so mythical as had been assumed. It was true that Capt. Sir John Ross, in proceeding to Baffin Bay in 1818, attempted to take soundings at the point where it was reported to exist in the older, and even in modern, English charts, up to that date. But inasmuch as Sir John Ross sounded with an ordinary deep-sea lead, and did not attempt (so far as appeared from the published account) to sound deeper than with 180-fathom line, it was not to be wondered at that he failed to strike bottom. It should be remembered, moreover, that it was not quite so easy a matter as some people might think to hit off a sunken reef of limited extent at sea. He would refer to a modern example of this difficulty well known to all hydrographers, but very instructive, inasmuch as it held out a warning that we should be more chary in ignoring observations made by prior navigators. In 1832 Lieut. Sainthill, on returning with his ship from Jamaica to England, suddenly came, in lat. 42° N. long. 41° W., or thereabouts, on discoloured water. He at once sounded, and, to his amazement, obtained bottom at 100 fathoms. In 1858, Commander Dayman, in attempting to verify this sounding, failed with 3000 fathoms of line; the result being that the correctness of Lieut. Sainthill's observation was disputed and attributed to some error. In 1864, Admiral Sir Alexander Milne had soundings taken in the same locality, and found, as Lieut. Sainthill had done, volcanic mud at 80 and 90 fathoms. As a climax, Commander Chimmo, in 1868, found no bottom at nearly 3000 fathoms, his observations being recorded in one of the numbers of the Society's 'Proceedings.' In the *Bulldog* expedition two lines of soundings were taken. The second line, on the return voyage, was carried from near Cape Farewell to near Rockall, chiefly between the 59th and 60th degrees of latitude. The depths indicated these remarkable variations, viz. 1620, 1168, 748, and 1260 fathoms; the last-named sounding being that in which 13 living starfish were brought up from the sea-bed, and the question of the existence of animal life at the greatest depths in the ocean was conclusively set at rest. There were two facts connected with

these soundings on which he would lay stress. The second line of soundings was carried on between the 59th and 60th degree of latitude, according to orders. It formed no part of the scheme to search for any supposed shoal water, but simply to ascertain the true depth for telegraphic purposes, and he would undertake to say that no soundings could have been taken with greater care or accuracy. The hitting upon no less depth than 740 fathoms was not to be wondered at; but the soundings, he ventured to say, sufficiently indicated the extreme probability of shallower water in the neighbourhood. His own inference was that this comparatively shoal water, presenting itself as it did just where the "sunk land" of the old charts was indicated, was neither more nor less than the result of the general subsidence of the land and sea-bed in the direction of Greenland, which all geologists know to have been going on for centuries. The further investigation of these questions in the Northern Seas was of the highest importance in a scientific point of view, not only as regarded the evidence it would furnish as to the relative configuration of land and sea, prior to and at the close of the glacial epoch, when (as propounded by Edward Forbes) there probably existed a continuous continent or series of islands from the north-west Arctic regions to our own shores (thus favouring the distribution of both animal and plant-life), but also as bearing on the great question of oceanic circulation, and the direction taken by the deep-seated Arctic drift on its passage towards the equator. As the condition of the ice in approaching Greenland from Iceland had been referred to by Mr. Major, he would take the opportunity of observing that, in July 1860, when nearing the south-east coast of Greenland, the *Bulldog* was completely barred from proceeding nearer than 20 or 30 miles by the impenetrable mass of drift and berg ice.

Mr. MAJOR, in reply, explained that Gunnbjorn's Skerries did not lie, as Dr. Wallich assumed, in a tract *south-westward* and midway between Iceland and Greenland, but, by the concurrent testimony of Ivar Bardsen in the 14th century, of Johann Ruysch in 1507, and of Van Keulen in about 1700, due west of Iceland, rather nearer to Iceland than to Greenland. They consequently did not fall within the line of soundings described by Dr. Wallich; still less could their position be made in any possible way to coincide with that of the "Sunken Land of Bus." The perfect coincidence of the above authorities, at such widely distant periods and so completely independent of each other, proved not only the former existence but the real site of Gunnbjorn's Skerries, and as Captain Graah was quite unaware of either one of these facts it is obvious that his opinion on the subject could have no weight whatever. That Mr. Bradford should find no hot springs near the interesting ruin at Kakortok was only what might be expected. Dr. Rink, the late Inspector of South Greenland, distinctly informed him (Mr. Major) that there were not in the whole district of Julianashaab any hot springs but those of Ounartok, near which he (Mr. Major) accordingly placed the monastery of St. Olaus. The church at Kakortok was quite distinct from that monastery, being, in fact, some five-and-twenty miles distant from it.

Fourteenth Meeting, June 23rd, 1873.

SIR H. BARTLE E. FRERE, K.C.B., G.C.S.I., PRESIDENT, in the Chair.

ELECTIONS.—*John Dixon Gibbs, Esq.; Hon. W. Nassau Jocelyn* (Secretary of Legation, Stockholm); *William F. Lawrence, Esq.; C. A. M'Vean, Esq.; Captain Rogers; Wentworth Sturgeon, Esq.; Malcolm Charles Wood, Esq.*

PRESENTATIONS.—*A. H. Baynes, Esq.; Henry Hill, Esq.; J. Wonnacott, Esq.*

ACCESSIONS TO THE LIBRARY FROM JUNE 9TH TO JUNE 23RD, 1873.—'Climats, Geologie, Faune, et Géographie, etc., du Brésil.' Par E. Liais. Paris, 1872. Donor the author. 'Descriptive Ethnology of Bengal.' By E. T. Dalton. 1872. Donors the Government of Bengal. 'Discours de M. Daubrée, prononcé aux Funeraille de M. de Verneuil.' Paris, 1873. Donor the author. 'A Natural and Civil History of California.' Translated from Miguel Venegas. In two vols. 1759. Purchased. 'California, from the first Discovery to the Present Time.' By A. Forbes. 1839. Purchased. 'Die Russen in Central Asien: eine Studie.' Von Hellwald. Augsburg, 1873. Purchased. 'The Mangrove.' By A. H. Bisschop. Netherlands, 1873. Donor the author. 'The African Sketch-Book.' By Winwood Reade. Two vols. 1873. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF JUNE 9TH, 1873.—United States Geological Survey, a sketch map of Lake Henry, showing the Sources of the West Fork of the Snake River. A Map of the Sources of the Snake River and its Tributaries. By G. R. Bechler, Esq., Chief Topographer. Presented by F. V. Hayden, Esq., Director of the Geological Survey. Coast of Chittagong, on 3 sheets. Surveyed by W. Pearson, Esq., Bengal Marine. Presented by the India Office.

The PRESIDENT in addressing the Meeting said he felt certain that there was nothing they would be more anxious to hear about than the health of their late valued President, Sir Henry Rawlinson, and he was glad to assure them that the indisposition, so alarmingly reported in some of the papers of that morning, was of so transient a nature that Sir Henry hoped to be at the post of duty to-morrow. He need not tell them how great a feeling of responsibility oppressed him in entering upon the duties of President after they had been entrusted to one so well qualified in every way to fulfil them to their entire satisfaction. When Sir Henry Rawlinson informed him that it was their wish that he should succeed to the chair, he hoped to have been home in time to add whatever influence he himself might have possessed, to that of those who would have been glad to see Sir Henry continue for a longer period to discharge the duties of President; but he found he had miscalculated the date on which the official arrangements for the year were made, and that he was too late when he arrived in this country. He had, therefore, only to thank them most cordially for the honour they had done him, and to assure them that the obligations of the office should always have his best attention. He could not expect that any amount of goodwill would enable a mere amateur geographer to fulfil the duties as they had been accustomed to see them fulfilled in the time of his predecessors; but he trusted he might be able to afford some sort of respite to his valued friend Sir Henry Rawlinson, and that, when the term of his own office expired, Sir Henry would again resume those duties which he had discharged with such credit to himself and benefit to the Royal Geographical Society. He should have felt it his duty, on his first appearance amongst his

Colleagues of the Society, to have given some account of what had been observed of Geographical interest during his late journey to the East Coast of Africa, but there was on the table that evening a paper of the highest interest, which he would on no account wish to see postponed, on the results of the Survey of Palestine, and as it might be inconvenient to occupy their time, even for a very short period, in discussing other subjects, he would only at present say a few words on matters which he was sure they would all wish to have their anxiety relieved about, and they were, first of all, what related to Dr. Livingstone, and secondly, what related to those gentlemen who had devoted themselves to the task of affording him relief. On the latter subject he was glad to be able to assure them that, so far as he knew, there was no foundation for the reports of the ill-health and ill-success of Lieutenant Cameron's party, which had been reported in some of the foreign newspapers. In a letter from Dr. Kirk, dated the 11th May, that gentleman stated that the party were, as far as he knew, in good health; a later date than anything they had from any other source. With regard to Dr. Livingstone, he could only tell them that wherever they went, whether in Africa or elsewhere, they found that what concerned him was of paramount interest. In Italy they were received with the greatest cordiality both by men of science and by politicians, but when he began to talk of the object of their mission they said, "All your objects are of very great interest, but what have you heard of Livingstone, or what are you going to do to relieve him?" A very old and valued friend of this Society, a Corresponding foreign member, the Commandatore Cristoforo Negri, welcomed them with letters as soon as they arrived in Italy, but the burden of all of them had some relation to Livingstone; and when they reached Rome they found the same interest attaching to everything connected with him, and the King of Italy had entrusted to him (Sir Bartle Frere) a gold medal, charging him, if he should have the happiness of meeting with Dr. Livingstone, to deliver it to him, but which he would now present to one of the members of his family, who would preserve it for him until his return. On the coast of Africa Dr. Livingstone's name was in everybody's mouth, and the Zanzibar Mission were looked upon in what, he ventured to think, was a light not altogether displeasing to the Royal Geographical Society, as persons come to carry out Dr. Livingstone's views. Dr. Livingstone was looked upon there as the great protector of the negro, as a man who had the abolition of the slave trade especially at heart; and even men who trembled with excitement whenever they pronounced his name—excitement not from friendship, but a feeling that he was the greatest obstacle to their gains—always mentioned his name with reverence and with the highest respect. He did not hear one single word from his enemies or his friends which cast a doubt for one moment upon the high character he had always maintained as a Christian gentleman, and the best type of what he would venture to call the modern Ulysses. He felt sure it would be a source of extreme pleasure to them to know that Her Majesty had been pleased to confer a pension of 300*l.* per annum upon Dr. Livingstone. He had received from Mr. Gladstone's private secretary a note in the following words: "The Queen has been graciously pleased to approve, on the recommendation of Mr. Gladstone, of the grant of a pension of 300*l.* per annum on the Civil List to Dr. Livingstone, in recognition of the value of his researches in Central Africa. The Treasury have given directions that during Dr. Livingstone's absence the pension should be paid to two trustees, Mr. John Murray" (one of his oldest friends) "and Mr. James Young, who, as I understand, has been acting as *quasi* trustee for Dr. Livingstone's children. Of course, on Dr. Livingstone's return, to which I look forward with some confidence, the pension will be paid to him. I have only

to add that you are at liberty to announce this grant at the next meeting of the Royal Geographical Society."

The PRESIDENT then handed the King of Italy's gold medal to Mr. James Young, who immediately placed it in the hands of the daughter of Dr. Livingstone, who was present at the meeting.

The PRESIDENT, in continuation, said he was glad to be in a position to mention that he met Mr. Thomas Livingstone, the son of Dr. Livingstone (regarding whose health there was a great deal of anxiety amongst his friends some little time ago), in Egypt, where he had taken up his abode as a merchant for the present, and where he felt very sanguine he would be able to do something for geography in the north of Africa, as his father had in the south. He would now read to them what Dr. Kirk said in the letter, dated the 11th May, regarding the Cameron Relief Expedition:—"I am glad to say the expedition is fairly off, and by the latest accounts is getting on well. Cameron must now be far through the wet country, and Murphy and Moffat are following after him."—He should mention that, when they were on the coast opposite Zanzibar, at Bagamoyo, they found that Lieut. Cameron and Dr. Dillon had just got clear of the coast, and were across the Kingani River—the first, and one of the worst marches—and were collecting their porters on the land-side of the river. To follow them with the rest of the expedition were Lieut. Murphy of the Artillery, and Mr. Moffat, a young and most worthy member of the family of Mr. Moffat, with whose name they were so well acquainted as one of the great civilisers of Southern Africa. He had joined rather late in the day. Directly he heard the expedition was on foot, he left his occupation in the colony of Natal and came up to Zanzibar, in the hope of joining the expedition, and it so happened that he came at a most critical period, when Lieut. Murphy, through having been obliged to sleep a whole night in the soaking rain, had got a severe attack of fever. He was extremely well cared for by the excellent French missionaries at Bagamoyo, and they saw him there tended with all the care that could have been taken of him in a comfortable English home. He was glad to hear that he had recovered sufficiently to set out with Mr. Moffat, but had it not been for this young man's opportune arrival to assist them, he did not know how they should have managed to get them all off. Dr. Kirk also said, "I am sending off to-day to Lieut. Murphy a special messenger with letters. He is thought to be about a week's journey on the way. I have only to add that no news have been received, which I take to be the most encouraging thing possible."

LIVINGSTONE CONGO AID EXPEDITION.

The Secretary, Mr. MARKHAM, next read a letter, dated April 3rd, 1873, from Lieut. Grandy, commanding the Livingstone Congo Expedition:—

"SIR, "BEMBE, April 3rd, 1873.

"I have the honour to report that I arrived at this place with 12 men and 48 carriers at noon, Saturday, March 22nd, and was very well and hospitably received by the Chefe, Senhor Vital de Bitancourt de Vasconcellos Côrte Real do Canto, and my men comfortably quartered in a spacious portion of the barracks. I much regret that, owing to my unexpected departure from Ambriz without the instruments, no observations for latitude or longitude have been made on the road. I had arranged that my brother should rendezvous at Kingombo (one day from Ambriz), with 12 men and 30 carriers, until I could join him with the remainder of the party and the cargoes, and he left on the morning of the 11th March. The next day, as no carriers were forthcoming, I went over in a hammock to visit the camp, and finding my brother had an attack of fever, sent him by carriers to Ambriz, and remained in charge. At

daybreak of the 13th, the carriers being impatient to proceed, and the weather looking favourable, I struck the camp, and started (unprepared as I was for the march) for Bembe, and accomplished the distance in eight marches, resting two days on the road. My brother was unable to procure the remainder of the men until the 22nd, when he started, and reached this place on the afternoon of the 31st March. From first to last, procuring carriers and looking after them, has been a great annoyance, and but for the valuable assistance rendered us by Mr. A. P. Mouchet of Ambriz, who worked early and late to promote our departure, we should in all probability have been compelled to remain at Ambriz until the heavy rains had passed. The usual price asked for taking loads from Ambriz to Bembe is from 10,000 to 12,000 beads, but we were compelled to pay 21,000 for each load, besides gratuities, to the *capataz*, and even then found great difficulty in getting men. I intended, after a short rest at Bembe, to return and meet my brother; but finding, on looking over the loads stored here, there were ten missing that should have been delivered, and one capataz, who started on 3rd March with nine loads, not yet arrived, I deemed it necessary to remain and look after the missing property; and I beg to record the great assistance I received from the Chefe in this matter; he dispatched soldiers with me to the different villages to make inquiries and threaten the truant carriers with punishment; by these means I have recovered all but two cargoes, one consisting of brass rods, the other of victualling stores and ammunition. I shall send full particulars of the loss to Ambriz, and as the capatazes Miranda and Antonio are well known there, I have great hopes they will be caught and the cargoes recovered. One of the Kruboys (Jim Manney), whom I punished on the 6th of March for a theft of beads and handkerchiefs from a bale of goods in the store, over which he was sentry, deserted on the night of the 21st March; but as his description, and the necessary authority for his capture were left with Mr. Mouchet at Ambriz, he will no doubt be taken and sent to Sierra Leone as a prisoner. Since our arrival here, the Chefe has sent round the district to procure carriers for us; but they all object to starting for the Congo this month, although I have tempted them by offering 10,000 beads per man, which is double the usual price. Their excuse is, that the road, being but little used, is completely hidden by the long grass, which at this time of the year is very high and thick, and that there is too much rain and water. To avoid losing any more time I have dispatched my interpreter (Aaron Lee), a soldier, whom the Chefe allowed to accompany me, and a native, with presents from me to the King of San Salvador, and a letter from the Chefe explaining the object of the expedition, and a request for 150 carriers to be sent at once to Bembe, which, if complied with, would procure him a handsome present. I expect an answer by the 17th inst. Should it be unsatisfactory, I must remain here till the rains are finished, and probably start about the 10th May. I have every reason to hope they will be over early, as they set in before their time, and were unusually heavy in October and November. I am taking observations for determining the position of this place, which, owing to the unfavourable weather, I have not been able to complete; these, with a copy of journal, sketch map of the route and this portion of the country, will be forwarded by the first opportunity.

(Signed) "W. J. GRANDY.

"*Sir Henry Rawlinson, K.C.B., &c.,*
"*President of the Royal Geographical Society.*"

The PRESIDENT, having to attend another meeting elsewhere, then vacated the chair in favour of Sir CHARLES NICHOLSON, Bart., Member of the Council, who called upon Major Wilson to communicate to the meeting the results of the recent explorations in Sinai and Palestine.

On Recent Surveys in Sinai and Palestine. By Major C. W. WILSON, R.E., F.R.G.S.

[ABSTRACT.]

IT is a remarkable fact that a country so replete with interest as Palestine to every branch of science, more especially to geography, both physical and historical, should have remained so long without any attempt at a systematic survey. It is only of late years that a thorough and organised system of examination has been entered upon.

The portion of country the investigation of which has been undertaken by the Palestine Exploration Fund and other kindred societies, under the superintendence of officers of the Royal Engineers, may be said to extend from Lat. 27° 43″ 20′ N. to Lat. 33° 26′ 10″ N., and, from the eastern shores of the Mediterranean, to Long. 36° 18′ 24″ E., embracing an area of 40,000 square miles. Major Wilson's paper dealt more immediately with the part already explored, and which is included in what is usually known as Palestine Proper; but a general description of the entire district will give some notion of the nature of the work and the difficulties to be encountered. At Ras Muhammed, the most southern point of the peninsula of Mount Sinai, the Red Sea branches off to the right and left, one arm forming the Gulf of Suez, the other the Gulf of Akabah. At the southern extremity of the peninsula thus formed, rise the Sinaitic Mountains, a vast crystalline mass, similar in character to the adjoining mountains of Africa and Arabia; on the east they descend abruptly to the Gulf of Akabah, whilst on the west they are flanked partly by an arid plain, extending to the Mediterranean. Northward, a sandstone district separates the Sinaitic Mountains from the limestone plateau of the Tih, a dreary desert, which, falling gradually to the north, is drained by the great Wady el Arish, or River of Egypt of the Bible. To the north-east of the Tih are the limestone hills of Judæa, rising near Hebron to a height of 2840 feet; and which, continuing northward with slightly varying altitude and almost without interruption, are finally linked to the Mountains of Lebanon by the hills of Galilee, which attain their culminating point in Jebel Jermuk, 4000 feet. West of this range lie the maritime plains of Philistia and Phœnicia; whilst on the east is the valley of the Jordan, forming a natural separation between Palestine and the great eastern plateau which stretches away almost to the Euphrates.

Captain Palmer, of the Ordnance Survey, well described the

peninsula of Sinai as "a desert of rock, gravel, and boulder—of gaunt peaks, dreary ridges, and arid valleys." It is extremely wild and rugged, and has one of the most complicated systems of drainage in the world. The great crystalline mass, forming as it were the "core" of the peninsula, is split up into innumerable peaks, which attain a considerable altitude (the highest, Jebel Zebir, 8551 feet), and present views of a most grand and impressive character. The sandstone district, rich in antiquities and mineral wealth, is broken up into quaint forms, which, combined with the rich colouring, give a peculiar charm to the scenery; in the cretaceous and tertiary districts, on the other hand, the features are devoid of interest, and the scenery is monotonous. The wádis or valleys are deeply cut, and descend rapidly to the sea; they frequently take their rise in open plains, or *fershs*, which lie at the foot of the peaks, and form one of the most interesting topographical features of the interior. The valleys appear to have been formed by the action of water, and in many places along their sides are lofty banks of alluvium. The water supply is more abundant than has generally been supposed; in the mountain district there are several small perennial streams, and numerous springs of good water, especially in the vicinity of Jebel Musa. The sandstone and limestone districts are badly supplied, and the water found in the latter is brackish and purgative. There is one hot spring at the foot of Jebel Hammam Farún, the temperature of which is 157°. The vegetation is scanty, but there are evident indications that it has formerly been more plentiful; even now, at certain seasons of the year, there is a considerable amount of vegetation on the upland plains, and, in addition to the well-known oasis of Feirán, there are several others scattered over the peninsula.

The climate is variable: in the higher districts the cold in winter is severe, and the peaks are frequently covered with snow; in the lower districts the heat is intense, and when the Khamsín blows, almost unbearable. The air is dry, clear, and bracing, and there is a great difference between the night and day temperatures. The average rainfall is small, but the country is subject to storms of great violence, which produce the "seils" or floods so much dreaded by the Bedawín.

One of the most striking features of Palestine proper is its natural division into four parallel strips, viz.:—

1st. The Coast Plain, from 10 to 20 miles in width, extending without a break from the desert on the south to Mount Carmel on the north, northward again of which lie the plains of Acre and

Phœnicia. The greater portion of the plain is fertile and cultivated; but in the northern portion are large swamps.

2nd. The Hill Country, commencing about 50 miles south of the Mediterranean, and interrupted only by the plain of Esdraelon, traversing the country from south to north. The hills are broad-backed, with here and there rounded summits rising above the general level of the range, their altitude averaging from 2000 to 3000 feet; the highest—Jebel Jermuk—being 4000 feet.

3rd. The Jordan Valley, which runs nearly parallel to the coast from the base of Mount Hermon to the Dead Sea, which occupies its deepest portion. South of the Dead Sea, the valley rises gradually for about 68 miles to the water-parting, which, at an altitude of 787·4 feet, separates the waters of the Dead Sea from those of the Gulf of Akabah.

4th. The Eastern Plateau, which attains its greatest altitude at Es Salt, 2771 feet; it is tolerably uniform in its characteristics, and maintains as far north as Banias a general altitude of about 2000 feet; at this point the grand peak of Hermon rises to a height of 8700 feet, and forms the commencement of the Lebanon. On the north the great plateau is covered by the basalts of the Jaulan, and east of this lie the volcanic hills of the Hauran and Ledja.

The one great river of the country is the Jordan. There is no other like it in existence—a purely inland river having no embouchure on the sea, and terminating its course at the very deepest part of the Old World, and far below the level of the ocean. Its principal tributaries are the Yarmuk and Zerka on the east, and the Wâdis Jalud and Zeria on the west. There are also several streams discharging their waters into the Sea of Galilee and the Dead Sea, as well as some flowing westward to the coast. Springs of fresh water, as well as hot springs, are numerous, one of the latter near Tiberias having a temperature ranging from 132° to 142°. Almost all traces of its former dense forest-vegetation have now disappeared, except in a few places on the mountains, and along the coast; remains of the ancient terraces, marking the era of terrace-cultivation, may be seen on almost every hill.

Owing to the peculiar formation of the country, there is great variety of climate; that of the Lebanon may be compared with that of the Alps, that of the Hill Country with Italy, and that of the Jordan Valley with the tropics. The most unhealthy months are May and October, during the prevalence of the Khamsín wind. The rainy season commences about the end of November, and lasts till March. The country is still subject to those sudden

storms so frequently alluded to in the Bible; and in fact there does not appear to have been any great change of climate since the times of the Kings of Judah and Israel.

Having thus described the principal characteristics of the country in which the operations of the British and American Societies are being carried on, Major Wilson gave a short abstract of what had been done by individual efforts; commencing with the publication in 1835 of Berghaus's 'Karte von Syrien,' with its accompanying memoir, which was the first serious attempt to classify and portray in a systematic manner the knowledge acquired by the earlier travellers of the present century.

Passing on to more recent dates, he observed that the idea of a regular survey might be said to have been formed in 1864, when the sanitary state of Jerusalem excited considerable attention, and schemes were proposed for providing the inhabitants with an adequate supply of pure water. With that view a finished survey of the city was subsequently made by Major Wilson and five non-commissioned officers of the Royal Engineers, the results of which were published by Her Majesty's Government. A line of levels was also taken from the Mediterranean to the Dead Sea, and from Jerusalem to Solomon's Pools. The bench marks then made have been connected with the triangulation of the survey now in course of progress, and have enabled the surveyors to check the altitudes of many of their trigonometrical stations. The party suffered considerably from the intense heat and bad water. The success of this survey resulted in the formation, in June, 1865, of the Palestine Exploration Fund. As a preliminary step to the work of this association, a cursory examination of the country to be surveyed was undertaken by Major Wilson, Captain Anderson, and one sergeant of the Royal Engineers. The results of this expedition, which remained in the country about six months, were briefly as follows:—Observations for time and latitude at forty-nine different stations; a line of azimuths from Banias to Jerusalem, giving independent determinations of longitudes for the points used; a reconnaissance, on a scale of one inch to a mile, of a district extending from Banias to Hebron, as well as one of a large portion of the Maritime Plain; special surveys of the Sea of Galilee and vicinity, Samaria, Beisan, and Mounts Ebal and Gerizim; an examination of the French map of the Lebanon, in which many errors were found; more than fifty plans of synagogues, churches, temples, tombs, &c.; and a large number of tentative excavations at different points, which yielded good results. Numerous photographs were taken, and two questions of some importance to the geography of the country were settled—

one, the point at which the stream from Wády Zerka enters the Jordan, the other the correct course of Wády Surar.

Encouraged by the extraordinary success attending the preliminary work, and taking into consideration the extreme interest felt by every one in Jerusalem, the Committee determined to devote their attention for the time being to excavations in the Holy City. And, in accordance with this decision, an expedition was sent out in 1867 under Captain Warren, R.E. The difficulties which he had to encounter, and the remarkable results which he obtained by his excavations, are already well known. He was able, however, whilst in Palestine, to carry out some important reconnaissances which added much to our knowledge of the country.

In 1868 a fund was raised, by the exertions of the late Mr. Pierce Butler, for an examination of the peninsula of Sinai, and, by the 24th of October in the same year, a party, consisting of Captains Wilson and Palmer, R.E., the Rev. F. W. Holland, and five non-commissioned officers of the Royal Engineers, left Southampton; they were afterwards joined by Mr. E. H. Palmer and Mr. Wyatt. The expedition was employed in the desert for five months, during which period at thirty-six encampments there were eighty-three sets of observations made for determining the time and latitude. The direction of the true meridian was determined at six different stations, and miscellaneous observations for azimuth and magnetic variation were taken at twenty-four points of the survey. In addition special surveys were made of Jebel Musa, Jebel Serbal, and their vicinities, on a scale of six inches to the mile. The relative positions and altitudes of fifty-six mountain peaks were determined by triangulation. A series of barometrical and hypsometrical observations were taken at Suez and at the camps of the expedition. Seven hundred miles of route-survey were made, extending over many parts of a district which may be described as bounded at its four extreme points by Suez, Ain Hudherah, Jebel eth Thebt and Tur. Special plans and photographs were made of all ruins and inscriptions met with, and geological, botanical, and natural history specimens collected. The entire results of this work have since been published on various scales.

In November, 1869, Mr. Palmer was sent out by the Fund to explore the Desert of the Tíh and part of Moab, and was accompanied on his journey by Mr. C. Tyrwhitt-Drake.

Leaving Suez, Mr. Palmer visited Jebel Musa, and thence travelled north-east to Beersheba, Hebron, and Jerusalem, by way of Ain Hudherah, Wády Byar, and Nakhl; from Jerusalem he passed southwards by an almost entirely new route through the Nejeb

to Petra, finally returning northward by way of the Dead Sea and Moab to Jerusalem.

Mr. Palmer accomplished his journey on foot in native costume, and the geographical results obtained are most valuable, as also is the collection of correct nomenclature and native traditions.

The Committee now felt that the period had arrived for the completion of an accurate survey, and at the annual general meeting of the Fund in June, 1871, it was resolved that immediate steps should be taken for carrying out the survey of Palestine; it was also announced that a similar Fund had been formed in America to co-operate with the English one, and that an arrangement had been made by which the English party was to survey the country west of the Jordan, whilst the Americans took the east.

Captain Stewart, R.E., was appointed to the command of the English party, with two non-commissioned officers from the Ordnance Survey; and they were joined in Palestine by Mr. Tyrwhitt-Drake.

The scale selected for the general survey was one inch to a mile, with a larger scale for plans of localities having special interest. The sheets for the projection of the work were prepared in London by Captain Bailey, R.N., each sheet containing 20′ of latitude, and 30′ of longitude.

The vicinity of Ramleh on the plain east of Jaffa was deemed the most suitable locality for the measurement of a base-line, which has been connected by triangulation with the Admiralty Survey at Jaffa, and with the Jerusalem Survey; it was also thought advisable to fill in the detail as the triangulation proceeded. Arrangements were also made to carry out a series of meteorological observations, in conjunction with the observatories previously established by the Fund at Beyrout, Nazareth, Jaffa, and Gaza, as well as at Jerusalem.

Captain Stewart landed at Jaffa on the 8th November, 1871, but was shortly after attacked with severe illness, which compelled his return to England; and the duties connected with the survey devolved (until the arrival of Mr. Drake) upon the non-commissioned officers. Captain Stewart was succeeded by Lieutenant Conder, R.E., in July, 1872; since which date the progress of the survey has been rapid and steady, and the programme laid down by the Fund efficiently carried out. In September, 1872, a second base-line was measured on the great plain of Esdraelon, and connected by triangulation with the first, the measured and calculated lengths agreeing most satisfactorily.

From the second base the triangulation was extended to the north

and west, and by January of the present year had been carried to Haifa and Carmel, and 1250 square miles completed and drawn on the sheets.

The survey is now progressing between Carmel and Jaffa. In addition to the survey, a most searching and vigorous system of archæological investigation is being carried out; geological specimens are being collected, and a geological map of the country prepared by Lieutenant Conder; and Mr. Drake is busily occupied in forming a collection of botanical and zoological specimens, in addition to his labours in ascertaining correct nomenclature, &c. The difficulties encountered, owing to the climate and the opposition of the people, have been by no means inconsiderable, and it reflects no slight credit on the party that the work should have been so efficiently performed.

Mr. F. GALTON asked Major Wilson if he could give any explanation of the tunnels near Jaffa.

Major WILSON said the water from the limestone hills appeared to have been kept back by the parallel ranges of tertiary sandstone. Marshes had thus been formed, and, at some unknown period, drifts were cut through the sandstone hills in order to drain the marshes behind. These drifts were, in many cases, now closed, and that was one reason why the neighbourhood of Jaffa was so unhealthy during certain seasons. Miasma was produced by the stopping up of the waters. There was a large tunnel, 10 feet or 12 feet high, cut right through the sandstone.

Mr. WOOD asked if any new light had been thrown upon the Sinaitic inscriptions. Mr. Palmer had promised an interpretation of them, but it had not yet been made public.

Major WILSON said it was greatly to be regretted that Mr. Palmer had not published his account of the inscriptions. No less than twenty-five bilingual inscriptions had been found, and from these Mr. Palmer had constructed an alphabet by means of which he was able to read every inscription found in Sinai. There could be no doubt that they only dated as far back as from the first to the third or fourth century A.D. They were merely short sentences, interesting in many respects, but having no bearing on the history of the Exodus. Mr. Palmer was probably so engaged at Cambridge, where he was Professor of Arabic, that he had not time to publish his interpretation of the inscriptions.

Mr. PHENÉ said he had been in communication with Mr. Palmer for some years, and had received from him drawings, made on the spot, of the buildings found in Palestine and in the desert of the Tîh. These had been most kindly sent to him to illustrate papers read by him (Mr. Phené) before different societies. From these drawings it was evident that the buildings were identical with those found in the Hebrides and in the islands of Arran in Galway Bay and at Holyhead. In section, in elevation, in construction, and in every detail, they were alike.

Mr. SAUNDERS said the paper which had just been read marked an epoch in geographical research, when scientific methods of investigation were taking the place of limited, individual observations. Travellers in Palestine had done *almost* all that could be expected of them, and what was lacking was now *being* supplied by the organised Survey carried out by the Palestine Exploration Fund. He believed that that interesting country was quite as capable of

exciting enthusiasm in the present day as it ever was; but the subject required a series of lectures, instead of a single one, to do it justice, and to show the necessity of such a Survey as that which Captain Wilson was promoting, the completion of which would bring home to our very doors a knowledge of the sacred localities which even pilgrims could not be expected to ascertain by isolated personal observation. By such means Palestine would be made to attract as great an interest as in the time of the Crusades, and a far more intelligent. He believed the time was rapidly coming when the extraordinary position which Palestine occupied in the very centre of the three continents of the Eastern hemisphere, and surrounded by great navigable inland seas, would make the Map that the Exploration Fund was engaged in producing, one of the most interesting and most sought-after documents in the whole range of geography.

Sir CHARLES NICHOLSON said the paper was one of a most able and scientific character, and would form an important contribution to physical geography. It was impossible to listen to a paper on such a subject without associating with it historical reminiscences of a kind which, perhaps, had no parallel in any other country. He was glad to hear that the district to the east of the Dead Sea presented no greater difficulties in the matter of surveying than the country which had already been surveyed to the west of that sea. Discoveries of a most interesting character connected with the archæology of that region might, therefore, be expected. If another Moabite Stone were found, it would repay any amount of labour, expense, and exertion, that might be incurred in obtaining it. Any one at all familiar with the literature of the Semitic dialects must know what interesting light had been thrown on that subject by the discovery of the stone, on which were forms of inflection and locution precisely similar to those found in the early books of the Old Testament. This afforded a convincing proof of the antiquity of those books. It was, therefore, desirable that the gentlemen who were engaged in the Survey should be alive to the necessity of preserving every trace of inscriptions. The theory of Mr. Forster, which referred the inscriptions on Mount Sinai to a period coeval with the Exodus of the Jews, had been long abandoned, and it had been satisfactorily ascertained that they belonged to a period not later than from the first to the third century. The whole of the peninsula of Sinai contained important Egyptian remains. In the north-eastern parts there were ruins of a large Egyptian city—Sarbool el Khadem—which must have existed near the line followed by the Jews during their sojourn in Sinai. It contained records of the fourth Egyptian dynasty, and of very extensive copper-mines having been worked there. It was most desirable, therefore, that those remains, as well as other historical monuments, should be examined.

He must now remind them that this was the last ordinary meeting of the session, and it was his duty to call their attention to the great obligation the Society was under to the Chancellor and Senate of the University of London, who had so kindly granted the use of their magnificent hall. He, therefore, asked the meeting to unite with him in a vote of thanks to the Chancellor and Senate of the University, as an expression of grateful acknowledgment for their liberality and kindness. It had been suggested that another and supplementary meeting should be held on July 7th, to receive some information with regard to Sir Bartle Frere's late mission, and to hear an account of a boat-journey up the River Wami in Eastern Africa, by Mr. C. H. Hill. That meeting would, of course, be conditional upon the Society obtaining the permission of the Chancellor and Senate of the University to occupy the theatre. He was not aware that there was anything likely to prevent the concession; but, still, as the use of the room had been limited to the ordinary nights of the session, it would be necessary to ask permission to hold this *Special Meeting*.

The vote of thanks to the Chancellor and Senate was then unanimously agreed to.

Fifteenth Meeting (SPECIAL), *7th July*, 1873.

SIR H. BARTLE E. FRERE, K.C.B., G.C.S.I., PRESIDENT, in the Chair.

ELECTIONS.—*Charles Campbell, Esq.* (late Indian Civil Service); *Thomas Dineen, Esq.; George Foggo, Esq.; Alpin Grant Fowler, Esq.; James Newell Gordon, Esq.; Admiral Sir Frederick Grey*, G.C.B.; *Alfred Keightley, Esq.; Donald A. L. McAlpin, Esq.*, R.N.; *William Sowerby, Esq.*, C.E.

PRESENTATION.—*William J. Mantle, Esq.*

ACCESSIONS TO THE LIBRARY FROM JUNE 23RD TO JULY 7TH, 1873.—'The Currents of the Dardanelles.' By W. J. S. Wharton. 1872. Donor the author. 'Zones of Stars observed at the U. S. Naval Observatory, Washington, 1872.' Donor Rear-Admiral Sands. 'Papers on the Eastern and Northern Extensions of the Gulf Stream.' By E. R. Knorr. Washington. 1871. 'Report on the Isthmus of Tehuantepec.' By R. W. Shufeldt. Washington, 1872. Donors the U. S. Navy Department. 'Centralasien und die Englisch-Russische Grenzfrage.' By Hermann Vámbéry. Leipzig, 1873. Donor the author. 'Descriptive Ethnology of Bengal.' By E. T. Dalton. Donors the Government of Bengal. 'Climats, Géologie, etc., du Brésil.' Par E. Liais. Paris, 1872. 'California.' By A. Forbes. 1839. By purchase. 'California.' By M. Venegas. In two vols., 1759. By purchase.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING, JUNE 23RD, 1873.—Map of Central Asia, showing the Russian possessions and conterminous countries. Presented by the War Office. 67 Sheets of French Charts. Presented by the Dépôt de la Marine, Paris.

LIVINGSTONE EAST COAST EXPEDITION.

The PRESIDENT, on taking the Chair, said he thought that on the present occasion, when they had met to hear something regarding Eastern Africa, he could not do better than read to them, in the first instance, the latest intelligence he had received from the East African Expedition which was sent out, at the instance of the Royal Geographical Society, to afford support to Dr. Livingstone. The latest date from Zanzibar was June 8th. Lieutenant Cameron wrote to Dr. Kirk, under date April 24th:—

"Going on as well as possible; passed Simbawenni this morning. I send these down by a caravan which passed us to-day. The Makata is perfect for travelling. I am all right again; but the constant travelling, donkeys' saddles, &c., have only just allowed me to pull up my journals and maps, and have not given me time to make a duplicate, but trust to do so from Rehenneko. Crossed the Ugerengeri to-day without an accident."

Dr. Kirk in a letter to Major Euan Smith, under date May 24th, enclosing the above, says:—

"The rains here are ended, and messengers have come from Unyanyembe

with letters of forty-one days ago. The Mirambo is losing power, but still holds the Arabs from bringing down ivory. I have as yet heard nothing of Livingstone, who should be working back to Ujiji, by the estimate he gave us. The people who come down, report great hunger in the Ugogo country, but by the time Cameron reaches it the crops must have been collected. In Unyamwezi there is abundance of everything."

On the 22nd May Lieutenant Cameron wrote from Rehenneko to Mrs. Kirk:—

"Dillon and I are all right now. I wish I could say as much for Murphy and Moffat, as from the letter I had from the former he was just recovering from fever, and was very weak. . . . I expect Murphy here to-morrow or the next day, and then [if he and Moffat can travel], *en avant* is the word, as I am tired of waiting and wasting time."

"Weather very pleasant here now—nights cool, and days not too hot; in fact, just the weather for travelling. You will see all our news in the letters I sent down on the 19th, so I have nothing more to tell. Bombay is doing very well."

There were some other letters, which, he was sorry to say, gave a very bad account of the health of Mr. Moffat—such as to cause considerable anxiety, but he trusted that the next accounts would be more favourable. There was a great deal of important matter, which he would ask the Secretary to read to them, including some extracts from a letter from Dr. Kirk, giving an account of an expedition which he made with Captain Malcolm, of the *Briton*, a very worthy descendant and representative of those who had a great deal to do with the foundation of the Geographical Society; and in that he gave some account of his visit to the Somali country to the north of the negro portion of Eastern Africa. A letter had been received from Lieutenant Grandy giving an account of the progress of the Livingstone Congo Expedition. The Secretary would also read a report by Mr. Hill, secretary to the Mission to the Sultan of Zanzibar, of an excursion which he made up the Wami River. This river, they would recollect, was indicated by Mr. Stanley as one of the probable easy routes into the interior of Africa, and to some extent the exploration which Mr. Hill made in boats under Captain Malcolm's guidance justified Mr. Stanley's opinion of this river. He thought they would find the letters altogether of considerable interest.

The following letters were then read:—

"SIR, "MSUWAH, April 10th, 1873.

"I am exceedingly sorry to find that I have overdrawn my accounts, but the necessary pagazi could not be obtained without; more especially as every Arab was working against us. We could not have come out at a worse time of the year, either with regard to climate or diplomatic difficulties with the Arabs. We have had our first hongo to pay here; thirty doti to a smiling old villain, who gave in return a goat, a small pot of matama, and half-a-dozen eggs.

"The people here, all or nearly all, live in the jungle, and have the reputation of being thieves and murderers, but as yet we have found no hostile action on their part.

"For my own part, for the last eight or ten days I have been so seedy as to be able to do little more than boil a thermometer twice, and keep a memorandum of our route. When we have come in from marching, I have been so done as to require leading from the rug I laid on, on getting off my donkey to my tent; however, I am now, I hope, getting better. It seems to have been a complete disarrangement of the stomach, with very slight fever.

"The country hitherto has been fine, rolling, park-like land, with patches

of jungle. We are halted here to-day to get supplies, and start on to-morrow. I am quite unable now to write any more.

"V. LOVETT CAMERON, R.N.

"*To the Secretary of the Royal Geographical Society.*"

"MY DEAR DR. KIRK, "'MSUWAH, April 10th, 1873.

"Here we are, grinding on. I have been very seedy since Moffat left, but I think am on the turn now. But some of the marches did try me terribly. I could not have walked a step after getting into camp. Five of our pagazi have bolted. We have had to pay thirty doti hongo, and waste time, through the old smiling villain here. Provisions are both dear and scarce. However, we go on again to-morrow, and I hope things may improve.

"V. LOVETT CAMERON.

"*To Dr. John Kirk, M.D., Zanzibar.*"

"MY DEAR CAPTAIN GEORGE, "REHENNEKO, May 22nd, 1873.

"As I promised to drop you a line sometimes, I will endeavour, as there is a chance for letters, to redeem my promise, though I am but a bad correspondent at the best of times.

"Here we are at Rehenneko, where Dillon and I have been since the 1st inst., waiting for Murphy to come up with the rest of our stores, and are expecting him to-morrow. I suppose we shall have to give him a day or two's rest, and then forward. I had a note from him just after I sent my letter of the 18th to the Royal Geographical Society, and he had been bad with fever, and young Moffat seems to be worse than useless; if when they join I find him so, I shall make no bones about the matter, but send him back with the first decent Arab caravan.

"We had a frightful amount of trouble at Bagamoyo in getting pagazi, and keeping them together when got. On our journey up here for the first 60 or 70 miles the country was very monotonous; rolling plain, thorn trees, and patches of jungle. I had a sharp attack of fever three marches out from Kikoka, which lasted me to 'Msuwah. I was so weak that I had to be helped off and on my donkey; but, thank God, I got round at where I tried for sights, but only got a sun D. A., which made the latitude 6° 47′ 44″ S.

"After 'Msuwah we made two marches to the Lugerengeri River, where we halted a day for food, and then we marched, with one halt, right through the Duthume hills of Burton, to Simbawenni, which we passed about nine in the morning, going on and crossing the Ugerengeri (same as Lugerengeri) the same day; here the pagazi almost demanded a halt, and so we made one; we then made a march to Simbo, which is nowhere—I mean there is no village, but caravans camp just about the same place on account of water. The next day we got into the Makata Plain, and had rather hard work in the mud, which was deep, stiff, and sticky; and directly we got into camp we had a smart amount of rain; however, we were able to go on next day, and crossed the Makata, or rather Mukondokwa, and two other streams caused by the rain. We had rain here all night, but next day we made a long march over a slightly elevated part of the plain, and got a good camping-place about one long march from Rehenneko.

"Next day, I and the caravan came on here, passing several big villages, some small streams, and one largish swamp. Dillon did not come on until the next day. I have got a few sights, which I send to you.

"I think I said in my letter to the Geographical, 2800 feet for highest *point* we passed; it should have been 1800 feet. If they send us any stores *up country*, could you send a thermal and some thermometers, as the pagazi *who* was carrying the box with ours in let it drop, and smashed the lock, and

I did not know it till next day, and lost all but one, which was broken. Luckily the maximum and minimum were in another box, and Murphy has one, so we can go on.

List of Sights.

'MSUWAH.

April
12*th*.—D. A. ⊙. 4ʰ 38ᵐ 08ˢ. 5ʰ 41ᵐ 33·3ˢ. Lat. 6° 47′ 44″ s. 31° 38′ 01″. 47° 35′ 40″. A. T. 1st sight 8ʰ 15ᵐ 35ˢ.

REHENNEKO.

April
6*th*.—D. A. ⊙. M. T. 8ʰ 41ᵐ 39ˢ. Alt. 35° 39′ 30″. M. T. 10ʰ 33ᵐ 34·5ˢ. Alt. 58° 14′ 26″. Lat. 6° 46′ 12″ s. Az. 1st sight C. Bg. N. 74° 30′ Var. 7° 22′ w.

May
7*th*.—Lunar ⊙ & ☾ M. T. 4ʰ 20ᵐ 44ˢ. ⊙ Dist. 123° 23′ 07″. Long. 37° 02′ 00′ P. M. Azimuth Alt. 30° 43′ 51″. C. Bg. N. 304° 30′. Var. 9° 36′ w. 1st Az. doubtful. D. A. ☉. M. T. 1ʰ 43ᵐ 03·2ˢ. Alt. 54° 14′ 03″. M. T. 3ʰ 39ᵐ 09ˢ. Alt. 30° 59′ 13″. Lat. 6° 49′ 11″.

13*th*, P.M.—Lunar, Jupiter & ☾ F. L. M. T. 8ʰ 50ᵐ 01ˢ. ⊙ Dist. 107° 35′ 18″. Dist. not in Naut. Almanac.
—Lunar, Mars & ☾ F. L. M. T. 9ʰ 14ᵐ 10ˢ. ⊙ Dist. 38° 36′ 21″. Long. 36° 49′ 07·5″.

17*th*, A.M.—Lunar ⊙ & ☾. M. T. 7ʰ 40ᵐ 21ˢ. ⊙ Dist. 119° 40′ 52″. Long. 36° 51′ 15″.

19*th*, A.M.—Lunar ⊙ & ☾. M. T. 9ʰ 15ᵐ 35·8ˢ. ⊙ Dist. 92° 27′ 20″. Long. 37° 13′ 37″.

N.B.—All the above sights were self-timed, which I found difficult for the distances, and I was more or less feverish or quininy the whole time.

May
19*th*, P.M.—Mer. Alt. α Crucis. 30° 51′ 25″. Lat. 6° 47′ 15″. Latitude used for lunars, 6° 47′ 33″.

"I wish I could send a more satisfactory set, but the distances all seemed good. As now the rains are over, and we shall have clear nights, I shall endeavour to get a latitude every night whilst on the march, and at any halt a set of lunars.

"V. LOVETT CAMERON, R.N."

The following papers were read :—

1. *Boat Journey up the Wami River.* By CLEMENT H. HILL, Esq.

CONSIDERABLE interest attaches to the River Wami, owing to the strong opinion expressed in Mr. Stanley's recent work * of its capabilities of being used as one great inlet into Africa of commerce and civilisation.

To prove, if possible, the accuracy of this statement, a small expedition was organised during the stay of Sir B. Frere's Mission at Zanzibar by Captain Malcolm, of Her Majesty's ship *Briton ;* and

* 'How I Found Livingstone,' pp. 233-243.

the following remarks give the results of that expedition, which are, however, but small, owing to the brief time at our disposal.

The Wami is situated opposite to the Island of Zanzibar in lat. 6° 6′ 40″ s., and between towns of Saadani (from which it is distant 7 miles) to the north and Windi to the south. It has two mouths, the Chanangu and the Furanhanga, distant from one another nearly 2 miles. The Furanhanga, or northern mouth, by which we entered, is by no means easy to discover from the sea, as the low mangrove-covered banks show little or nothing to distinguish them from the rest of the coast. It is, moreover, dangerous to enter except at flood tide, owing to the existence at the mouth of bars of shifting sand.

The entrance of the river is from 70 to 100 yards broad, a breadth which it maintains, speaking generally, as far as we ascended it: and its depth as far as the Chanangu junction, at which point the tide ceases, is not, even at this season of the year, less than 7 feet. This depth decreases higher up, till in places there is not more than one foot of water, though 3 feet may generally be counted upon by hugging the concave bank. The river, which, it may be added, is full of snags, winds so greatly that our course varied almost round the compass.

The low mangrove-covered banks of the first few miles of the river alter in character as one ascends, becoming higher and more open, while the country is covered with high thick grass interspersed with thickets, which become almost a forest at the spot where we first encamped, about 9 miles up.

We saw no natives nor any signs of habitations beyond a deserted hut or two near the river till we reached Galooka and Saguirra, two small villages about 12 miles up, inhabited by the Wdoi, a tribe of reputed cannibals, but who showed themselves to us only as a mild and almost vegetarian race.

The furthest distance which we succeeded in reaching in two-and-a-half days from the mouth was 23 miles, our progress being but slow, owing to the need of frequent recourse to the oars to make any way against the strong current (of nearly 3 miles an hour) when the wind failed: no light work under an African sun.

This brought us to the foot of the Hibohero Hills, in lat. 6° 13′ 50″ s., a low range, of which I can find no mention in either Stanley's or Burton's recent works. From this spot we could see, about 9 miles to the west, two higher hills, apparently 1000 or 1200 feet high, and which would probably be the Dilima Peaks laid down in Mr. Stanley's map. Here the country became more open, the grass shorter, and the whole appearance more park-like. Here, too, as elsewhere, the river in the rainy season overflows its banks

to the distance of at least 3 miles, washing up shells, quartz, and rounded pebbles.

But little game was found, except that a herd of ten giraffes and a troop of zebra were seen in the neighbourhood of Saadani. The river, however, abounds in crocodiles and hippopotami (I counted twenty-three of the latter up at once within a space of 100 yards) to such an extent, exaggerated though the statement may sound, as to throw a real obstacle in the way of the passage of light craft. I say this, having felt the heavy pinnace in which we were raised some 6 inches, by three hippopotami, against whom we struck as they lay under water, on our way up, and having seen holes made in the bottom of a cutter, whilst we were in the harbour of Dar-es-Salaam, by the teeth of a hippopotamus which attacked it, though unwounded. Had either of these accidents happened in the Wami to a light craft, the crocodiles would not have been slow to take advantage of the presence of its crew in their waters. Doubtless, however, these animals will soon be killed down, and the hippopotami should be capable of being utilised in some way—as glue, leather, or tallow, for instance.

It may be of some interest to mention here that we ascertained, by sounding the places where hippopotami had gone down, that they can conceal themselves so effectually that not a ripple shall mark their presence in little over 3 feet of water.

A native of Galooka, with whom I conversed through an interpreter, stated that no slave-dealers came up as far as that village, which, as is the case with all the district through which we passed, is ruled by the Governor of Saadani, under the Sultan of Zanzibar.

The same native said that the Wdoi professed the Mahommedan faith.

All the natives with whom we conversed up this river concurred in stating that we were the first white men who had ever been seen there.

No cases of sickness or fever occurred amongst our party, and I should judge that in the dry season the country is healthy.

So far as it is possible to judge from the short distance we were able to go, and from the statements of the natives, who said the river continued for the distance of a moon's journey of the same depth and width, there is every reason to suppose that Mr. Stanley may be correct when he says that the Wami can be navigated by steamers drawing 2 or 3 feet of water for a distance of 200 miles: but that this navigation would be valuable for commerce is a question on which, as before remarked, time did not allow us to

form a definite opinion. I think I shall be supported by the naval officers whom I accompanied, when I say that the Wami is not navigable for practical purposes of commerce by any craft which has not steam-power.

The timber we saw—acacias, gourd trees, thorns, with here and there a palm—would not repay an expedition. Cultivation, so far as we went, was but very scanty and confined to pumpkins and a little maize; and the country, rich though the soil apparently is, was so thinly populated that no assistance could be expected from, or trade looked forward to with the natives.

An expedition which had time to penetrate as far as Mbumi might produce valuable results.

The PRESIDENT said he thought that the Fellows of the Royal Geographical Society would concur with him in considering that they might return thanks to Mr. Hill, who was one of their recently elected Fellows, for the paper which had been read. He would now ask the Secretary to read to them some extracts from a letter from Dr. Kirk, giving an account of a visit which he had paid, in company with Captain Malcolm, to the coast of the Somali country, to the north of the true Negro country of East Africa.

The following was then read :—

2. *Visit to the Coast of Somali-land.* By J. KIRK, M.D., F.R.G.S., H.B.M. Consul, Zanzibar.

"DEAR SIR BARTLE, "ZANZIBAR, May 11, 1873.

"I told you in my last that Captain Malcolm had invited me to accompany him in the *Briton* on a visit to the northern part of the station; the chance was one not to be lost, especially as I had written the letter, explaining the course to be followed with the slave dhows after the 1st of May, to the Sultan, and it seemed very much better he should digest it quietly. Before going I also explained the matter to Tana and Likindais. We touched for a few hours at Pangani, a difficult harbour, impassable to vessels over 200 tons, yet carrying on a large trade in ivory with the Massai country and the hills to the south. Caravans from Pangani also reach to the Nile lakes, and go even to Baringo. The trade here is in the hands of Bhattias, of whom there are about thirty; there is only one Bobera, and, I think, three Khojas. Here, as elsewhere, these people trade, but an agricultural population is growing up among the Makulla, and Sheher men, retired soldiers of the Sultan chiefly, who from keeping petty stores have now planted sugar-cane to a very considerable extent up the alluvial valley above the mangroves. For want of proper machinery and knowledge chiefly, but possibly also in part from a saltness in the soil, they do not make sugar but molasses. We must recollect, again, that molasses pay (considering there is no trouble in their manufacture) about as well as sugar. Grain, too, is largely cultivated, but the slave-trade is the curse of the land. Two years ago the valleys between the Ushambala hills and the highlands themselves were peopled with very industrious races. This was the old kingdom of Kimwere, which, like all African states, lasted but for the life-time of the man who by his energy made it. The tribes commenced fighting with each other. Captives were sold—slaves brought in thousands into Pangani, which suddenly became a great place of export, from having imported slaves from Quiloa the year before. This slave war did not last long, as the place was depopulated to such an extent that the few remaining

villages became afraid; but the same thing still goes on, though to a less extent here as elsewhere along the coast.

"We went in the *Briton* direct to Mogdesho, or 'Magadoxo' of the charts. I was much struck with the number of large dhows at anchor, and volunteered as interpreter to the boats sent to examine them. We found twenty vessels, from 50 to 200 tons, all filled with or taking in native grain, which I learnt is largely grown on the river behind, near Geledi, where Ahmed Yoosoof lives, to whom I gave you a letter. There was no suspicion of slave dealing here, but, on the contrary, a large commerce in grain; while a coasting steamer and schooner, the one of Schultz, the other of Tarra, had just left with ivory and hides. I was very much pleased to see this trade going on. We could not land without swimming through the surf, and as Captain Malcolm did not feel desirous to remain next day, we took the opportunity of calling on the chiefs, and examining the really nice-looking and most interesting town of Mogdesho. I sent a message by the interpreter of the ship to the head man of the elders who manage the place. This man styles himself the Iman Mahmood. All the people on the beach were armed, but this was their usual mode of appearing, and no sign of ill-feeling. I am sure nothing either could have been more respectful than the conduct of the people in the dhows we boarded, unless when they were amused to see us hunt for slaves and find none, when they evidently had a good laugh; but all the tales of the fear of the Arabs at being boarded are clearly false from what I saw. There was not a man who doubted he would get justice, and as there certainly were no slaves in harbour, they took the search in the greatest good humour.

"We touched off Merka, but there again could not land, reserving our time for Brava, which I regretted, as it is the worst by far of the four Somali towns, of Worsheikh, Mogdesho, Merka, and Brava, which together constitute the 'Benadir,' or 'the ports' in the language of East Africa. Off Merka there were nineteen dhows, all loading native grain, brought on camels and by men from the river of Geledi. Determined not to be defeated in our visit to one of the Benadir at least, we anchored at Brava. Here there were no dhows loading, as this is not a grain port, and the ivory and hides had all been exported already, either in dhows to Zanzibar, or in the steamer and schooner mentioned above.

"The surf was high, but we landed; getting on shore here is not an easy thing, and on all but the first occasion we found it far the best way to swim through the surf to the boat and from the boat, for we could not afford to delay until the tide had fallen, when it is comparatively smooth.

"Seeing the people perfectly friendly, I proposed an excursion into the Somali country for one day; crossing the desert sand-hills that all along bound the view from seaward. Next morning, at day-break, we were on shore. I had engaged a relative of one of the head men to be our guide. We ascended the sand-hills, where were curious lines they called fences, to mark fields and gardens, but not a trace of any plant on the burning sand, unless regular desert-bush, such as you might see near Aden. The vegetation was peculiar and new to me, but African still in every respect. I made a small collection, but the fields I mention struck me as so peculiar, that I asked the meaning, and was told that in one month the rains would commence, and that, although they did not last long, for the time the gardens would be full of melons and vegetables. It must be a strange transformation. From the crest of the sand-hills, near Brava, I saw as noble a sight as I ever have in my life; it equals the plain of Damascus, but is far more level and extensive; as far as the eye could reach landwards was an endless plain covered with low trees, seemingly chiefly of the mimosa class; the distant horizon was as clear and level as the sea, and the sun's meridian altitude might have been taken on it with equal accuracy.

"On the counterslope of the hills the vegetation became much more abundant, and the plain, considering we were now at the close of the dry season, was rich. The guide pointed out the position of the now dry bed of the marsh, where the river of Geledi loses itself, for that stream never reaches either the Juba or the sea, and although even now containing water higher up, is here quite dry. This was the first year the people recollected to have seen the marsh quite dry.

"I have said that the plantations yielding the grain shipped from Merka and Mogdesho are on the borders of this stream; there two large crops of black sesame-seed are raised, and this, together with the picking of the coarse orchella weed, explains why Somali-land takes so many slaves, that are not exported to Arabia as is popularly imagined, but retained for work in the land itself. Somali-land must be a truly magnificent country, once you are away from the coast. It exports cow-hides by thousands, also ivory, but this comes from a distance; and until I came here I never knew there was so much cultivation. We tried to enter the River Juba, but the bar was quite impassable; next anchored in Kismayo (not of the charts, but in the bay near Cape Bissell). This is a really fine harbour, safe in all winds, and from its position, being the last harbour north of Lamo, unless Durnford, must in the end command an immense trade. There is, in fact, between it and Guardafui no other place to be called a harbour safe during the south-west monsoon. I had special reasons for wishing to visit this place. First, it had been encouraged by the late Seyd Majid very much under my influence and advice, with a view to country commerce in the line of the Juba; and, secondly, in order to make the inquiry I had been asked to carry out here, regarding the story of white slaves in Galla-land. Of the latter I could get no information whatever in the settlement, but took off a couple of guides with me for a long day's walk in the bush, where I collected plants. From these men I found out that the man who accompanied the Frenchman who gave the story to Mr. Churchill in Zanzibar was then at Kismayo; on return I found him and heard all he had to say, but this amounted to a statement that he had heard, when up the Juba with the Frenchman, of white captives, among whom was a woman, among the Gallas, but distant quite a month's journey from Berbera. The fact is, that the Gallas are now driven far off from the coast, and not found within a month's journey from the coast in this part. With the place which this man indicated, I should imagine Genanah, on the River Juba, must be in communication; it again trades with both Brava and Kismayo; but unless from this one individual I could at neither of these places obtain the smallest trace of such a report.

"We visited in the boats the Tola and Shamba rivers of the chart, both salt-water creeks of no importance, with very bad entrances, unless to boats. They are not rivers but creeks, the country on their banks being rock or light soil, covered with an impenetrable jungle of thorn-bush. Thence we steamed, in rainy and windy weather, the whole way to Zanzibar.

"The Cameron Expedition, I am glad to say, is fairly off, and by last accounts getting on well. Cameron must now be far through the wet country, and Murphy and Moffat following after them. I am sending off to-day to Murphy a special messenger with letters; he is thought to be about a week's journey on the way.

"JOHN KIRK."

The PRESIDENT said he need hardly remind them that the purpose of the late mission to the East Coast of Africa was not one of geographical discovery. It was a public duty they had to perform, and he hoped they did their best to carry it out; but they also felt that, as Fellows, *in esse* or *in posse*, of the Royal Geographical Society, they owed it as a duty to the Society not to return home empty-handed if anything came in their way, of geographical interest,

and Mr. Hill, Mr. Grey, Major Smith, and Captain Fairfax, who had been a long time on that coast, as well as his own son and himself, all felt that it was their duty to bring back something in the way of geographical information. He thought, however, that the paper which they had heard read that evening, embraced almost the only item of really new information which they had the good fortune to bring home; but they had the opportunity of seeing a great deal of the possibilities of easy additions to the stock of knowledge of the geography of East Africa, which it struck him they might like to hear, and, if they would permit him, before calling upon any of the Fellows present to discuss the questions raised, he would give a very brief account of some of the things which they saw.

3.—*A few Remarks on Zanzibar and the East Coast of Africa.* By Sir H. BARTLE E. FRERE, K.C.B., ETC., PRESIDENT.

IN the remarks I have to offer on the geographical results of the late Mission to Zanzibar, the Society will not expect anything of real novelty, for the object of the expedition was not geographical discovery, and we went over ground often traversed before by accomplished observers in every branch of science; but as all the members of our party * were, or hoped to be one day, Fellows of the Royal Geographical Society, we felt that no opportunity of acquiring fresh geographical information ought to be neglected, and we may at least be able to indicate some points on which further valuable information may be easily obtained.

I must leave our excellent fellow-labourer, Mr. Badger, to tell you of the many courtesies we received from the Royal Geographical Society of Italy, who, through their President, the venerable Commendatore Negri Cristoforo, expressed their interest in the geographical questions which might receive some light from our expedition. To the Commendatore's good offices I may also ascribe the interest expressed by his Majesty King Victor Emanuel, who accepted from Mr. Badger a copy of his translation of the travels of the Bolognese traveller Varthema, published by the Hakluyt Society, and made me the bearer of a gold medal for Dr. Livingstone, as mentioned at our last meeting.

Mr. Badger will, I hope, tell you that this notice of the old Bolognese was not without result, as His Majesty's Government communicated with the Municipality of Bologna, and an order has been given for the erection of a monument to the traveller more than 350 years after his death; for which act of posthumous gratitude Varthema may, next to his Majesty King Victor Emanuel and the

* Rev. Percy Badger; Col. Pelly, C.S.I.; Capt. Fairfax, R.N.; Major Euan Smith, C.S.I.; Mr. Clements Hill; Mr. Charles Grey; Mr. B. Frere.

Commendatore Negri Cristoforo, thank his accomplished English translator and critic.

I may notice in passing that we were struck in Egypt by the great amount of information obtainable from casual travellers to the south and westward, and by the want of any efficient machinery on the spot for collecting and combining such information, which is constantly being brought to Cairo from the distant regions of the Upper Nile. Intelligence of great interest, regarding such travellers as Baker, is, of course, sent on with regularity and despatch; but facts of minor interest, often of great value in filling up or correcting our maps, are less noticed or more imperfectly recorded.

It is possible that Mr. Vivian, or some other Fellow of our Society resident in Egypt, may be able to organise on the spot some local branch association for collecting such data and transmitting them to Europe for publication. Such an association would, I am sure, receive every aid from the enlightened Government of H.H. the Khedive and such Ministers as Sheriff Pacha.

At Aden there is a similar supply of detached fragments of information regarding adjacent countries which are well worthy of record, but hitherto the interests of geography have been well cared for by the Political Agent and his assistants, who only require to be reminded that information which is not new to them may be both novel and important to geographers at a distance. At Aden we found some Roman Catholic Missionaries, who were attempting to return to Shoa, and through whom, I have no doubt, much information could be procured regarding Southern Abyssinia.

They mentioned, as within the range of their Mission tours, almost all the Galla provinces, many of which are marked on Keith Johnston's map as doubtful, or placed from native report only; but the gentlemen we happened to meet with had not paid any special attention to geographical questions, and seemed unaware of the great possible value of their observations.

The same was apparently the case with the great Mission to Khartoum and Kordofan, the parent house of which is, I believe, at Verona. Monsignor Camboni, who has for some years past so ably presided over the mission, and whom we met at Cairo, has indeed published a great deal of geographical detail in the missionary records, but I have no doubt that much more might be obtained, if some of our fellow geographers would apply to the superiors of African missions, whose parent houses are found in Italy, France, Belgium, Switzerland, and Germany.

A glance at the map exhibited this evening will show the course

taken by the Mission; we went as far south as Mozambique, touching, either on our way down or returning, at most places of importance on the mainland between Ras Hafûn and Mozambique, and at the islands of Pemba, Zanzibar, and Monfia. From Mozambique we crossed to Madagascar, visiting Majunga in Bembatooka Bay, Nossi Beh in Passandava Bay, Mayotta, Johanna; returning by Kilwa-Kavinja to Zanzibar, thence to Bagamoyo to assist in starting Cameron's expedition; Mombas, whence we visited the Missionary stations of Ribe and Kissoludini, Lamoo, and Ras Hafûn. Thence across to Maculla, Shehur, Muscat, Kurachee, and Bombay, and so back to Europe.

With regard to the African seaboard outside the Red Sea, the whole coast, as far south as Ras Hafûn, has been thoroughly well surveyed by officers of the Indian navy. South of this, the principal hydrographical authority is the survey of Captain Owen, made half a century ago. At the time of its compilation it was, indeed, a marvellous work of energy and scientific accuracy, the whole of the east coast of Africa, with great part of the adjacent islands, including Madagascar, having been surveyed, and many points accurately fixed in the space of two years. The exertions made entailed the loss of two crews, mainly, as has since been ascertained, owing to the use of bad water and the mistaken treatment then universal in cases of African fever. The work, of course, was simply a running survey, but it has served as the basis of all hydrographical records from that period to this. The results of Captain Owen's survey, and of all the subsequent additions to it, have been admirably summarised in the excellent Manual * of our Fellow, Mr. Findlay, who appears to have exhausted all existing authorities to make his volumes as complete as possible.

But a glance at almost any page of his invaluable Manual will show how frequently he is obliged to note such deficiencies as, "this river appears never to have been surveyed;" "this harbour has been very imperfectly examined;" "these islands are only approximately laid down;" "vessels should be careful in approaching this part of the coast, as rocks and reefs are known to exist, which have not been surveyed;" and almost every sheet of the Admiralty Charts bears a prominent notice of the imperfection of the data at command, and a warning that the chart cannot be regarded as a safe guide to the navigator.

I will mention a few points to which the attention of the surveying

* 'Sailing Directions for the Indian Ocean.'

officers might be usefully directed, but first I will briefly describe the coast as it appeared to us between Ras Hafûn, the most easterly promontory of Africa, and Mozambique.

Ras Hafûn itself may be described as the crater of an extinct volcanic explosion, which has raised the limestone beds to a height of about 400 feet above the sea-level, not in detached peaks, but with a nearly uniform surface towards the east, the broken strata dipping inwards towards the centre of the crater, open on the western side towards the mainland, to which it is joined by a spit of sand. The bays north and south afford good anchorage and shelter, according to the monsoon, at all times of the year. From this headland the coast, for a distance of many miles, is a uniform rocky wall, with apparently few indentations, and no mountains in the interior visible from the sea. About Magadoxa the coast becomes very sandy, with occasionally rocky bluffs as far south as the Juba River; a fringe of coral reef and islets here begins to mask the coast; south of Melinda the sand-hills cease, and the coast assumes that aspect which it bears with little variation as far south as Mozambique.

The appearance of this Somali and Galla coast is singularly uninviting, seen as it usually is during the dry season (for during the rains vessels keep far off the shore); there are no traces of cultivation or pasturage, and at first sight all appears utterly barren and almost uninhabited. A nearer approach to the shore shows, however, numerous paths, parallel to the coast line, indicative of considerable transit along the shore. Smoke-signals by day and fire-beacons by night are seen giving notice along the coast that a vessel is in sight; and if the vessel approaches near the land, as if about to send boats ashore, groups of natives, generally armed, are seen collecting from all quarters and coming down over the sand-hills. The fact is that, as described by Dr. Kirk, the barren hills of the coast generally mask a country of great natural fertility, supporting a considerable population of pastoral tribes, with much cultivation in parts.

The few towns, such as Magadoxa, Merka, and Brava, through which the Somalis of the East Coast communicate with the outer world, are evidently centres of considerable commercial activity. The more opulent of the permanent inhabitants live in substantial masonry houses, which give to the towns, when seen from the sea, a very imposing appearance. The town is always capable of defence against the surrounding tribes, and strangers, who are not inhabitants, are usually turned out of the town at sunset. Municipal affairs are generally managed by a kind of republic or corporation

of elders, even when there is an Arab governor and garrison from Zanzibar.

Round the walls to some distance are seen the tents and huts of the nomad population who come to trade.

Cattle-hides, orchilla-weed, small timber, and oil-seeds, and a few small horses, donkeys, and camels, are at present the principal exports, with a few articles, such as ivory and ostrich-feathers, from the far interior.

Of late years there seems to have been considerable migration from the north coast to the south-east, and clans are now met with on the latter coast which have come from opposite Aden.

The principal caravan routes have been fully described by General Rigby, Captain Burton, and others; but I may mention that I am assured by Dr. Hildebrand that he met at Zeila and Berbera, traders who had come from the Lake Region, and who told him that the route thither was annually traversed by small caravans from the North Somali coast, who bring down ivory and slaves, and return with cotton manufactures, brass wire, and beads.

The latest information on the painfully interesting subject of European *détenus* among the Somalis will be found in the extracts from Dr. Kirk's letters. It is very possible that there may be more white men living among the Somalis than we are now aware of, and not in a state of captivity. One Englishman has lived for some years as agent for a German mercantile house at Brava, and for some months his wife (an Englishwoman) lived there with him; and Dr. Hildebrand has found it possible to travel among the Northern Somalis with no other guard than the chiefs afforded him. Mr. Brenner, the Austrian Consul at Aden, who was in the suite of the unfortunate Baron von der Decken, assured me that he had subsequently travelled alone and on foot for many weeks at a time amongst the Somalis, and believed them to be by no means inhospitable to travellers who took care not to excite their cupidity or affront their prejudices. They are an exceedingly hot-tempered, irascible race, who know no law but blood for blood, and are prompt to resent the slightest insult; but to strangers who do not offend them they are by no means inhospitable.

Between Melinda and Mombas the coast changes from the uniform barren sands and rocky ridges of the Somali coast, and assumes the typical features of the coral-fringed coast of East Africa. From Melinda to Mozambique the general features of the immediate vicinity of the seashore are those of raised coral-reefs, or sand and gravel beaches. Seaward the coast is fringed with a perfect labyrinth of coral reefs and islets, which, according to circum-

stances of weather and current, prove the greatest dangers or afford the greatest facilities to the mariner. Woe to the large sailing vessel which finds herself set by the current or driven by the wind into the labyrinth, the intricacies and dangers of which are very imperfectly shown on his chart. The water between the reefs is often too deep to allow of anchoring, even close to the shore, and unless the wind be fair and daylight favourable, no prudent mariner will take a sailing ship near dangers which are more frequently just under than above the surface of the water.

But to the Arab mariner who knows the coast and its dangers by long practice, and who never willingly sails except at the season of regular steady winds, and always, if possible, anchors at night, the coral-reef fringed coast affords peculiar facilities. There is always smooth water inside the reefs, however hard it may blow outside. In fine weather, with the sun at the navigator's back, the reefs are easily seen by the colour of the water; when it blows they are marked by the break of the sea on their edges, and there are generally frequent openings, with deep-water channels, in the line of the reefs, giving easy access from one set of channels to another. The Arab dhows usually, if they can, navigate these seas in company, two or more together, and as they rarely attempt to beat against a wind, or to sail on after dark, and as time is to them of little consequence, they meet with disaster more rarely than might be expected of such frail barks, in seas so thickly studded with reefs and sand-banks. The beauty of the low coral islands has been often described.

It will be evident, from what has been stated, that even for the ordinary purposes of maritime commerce a completely new survey is imperatively required, and the Society will be glad to hear that the Admiralty have resolved upon sending two vessels to effect a complete re-survey of the whole coast: I trust the Society will lend the weight of its authority to insure this survey not only filling up the gaps in our knowledge of the hydrography of Eastern Africa, but also throwing light upon some of the many obscure questions connected with the natural history, as well as the geography of the coast. It will be seen that, with the exception of the Zambezi and Rovuma rivers, to which attention was especially directed by Livingstone, hardly any of the larger rivers of this part of the coast have been thoroughly examined, even in that portion of their course which is nearest the sea. It is quite possible that a detailed and careful examination of the mouths of these rivers may lead to the discovery of a practicable boat communication between the upper

river and the sea, or at any rate may show the points to which land transit is most practicable between the sea and the navigable water of the inland river.

Among the rivers which are most likely to repay examination are the Juba, the Pangani, and the Lufiji. The last-mentioned river appears especially to deserve attention. The delta is said to be extremely rich land, and the grain of the Lufiji sells in the Zanzibar market at a higher price than any other. The river is said to be navigable by canoes for a very great distance above the delta. Very considerable additions to our geographical knowledge of all these rivers, and the basins which they drain, might be made, if the surveying officers had instructions to send boats as far up each river as the water would allow; and if the surveying parties were furnished with interpreters, competent to extract from any trading-parties they might meet, information regarding the trade-routes which branch off from the river.

It has been shown by Messrs. Wakefield and New that much may be learnt on this coast, as everywhere else, by a patient registration and comparison of lists of the usual halting-places of trading caravans. These halting-places vary less than is generally supposed; and though the traders are, at first, shy in giving such information as they possess to strangers, they are not indisposed to communicate with those whom they know and can trust.

It will probably be found that trading journeys between the East and West Coast are not so infrequent as might be imagined. Bishop Crowther, on the Niger, met traders who had come from the East Coast; and General Amiral, the Governor-General of Mozambique, informed me that when he was Governor at Loanda, two Arab traders visited the Angola Coast, who had come from Zanzibar. He had himself sent from Loanda two negroes, who returned after eighteen months, having made their way to Iboo, the Portuguese settlement north of Mozambique, and brought back a letter from the Governor of that place; being, like most of the negroes, illiterate, they could give no connected information regarding the route they had taken. But the Arab traders can frequently read and write, and might probably be easily induced to keep a list of stages, with the number of hours' march between each, and a note of any towns, lakes, or rivers, &c., they came across.

Several of the islands afford a field for interesting research, within easy reach of the boats of a surveying ship. Pemba, though so close to Zanzibar, is very imperfectly known, and its flora appears to differ from that of Zanzibar more than might be expected from the proximity of the two islands.

Captain Frazer spent a month upon it, and described it as full of interest, and not so unhealthy as it is generally reputed, if the mangrove swamps on the west side of the island are avoided.

Monfia, though so close to Zanzibar, has never been thoroughly examined. The natives describe it as containing several lakes, which abound with hippopotami. A few Indian traders reside at the principal town, and the finest mats made on the coast are manufactured there.

Of Great Comoro we only know enough to excite our curiosity; and the extraordinary bulk and activity of the volcano indicate it as well deserving more careful examination. Mr. Sunley assured me that, during the last eruption, the streams of lava appeared from Johanna to cover the entire southern face of the mountain, and the light was sufficient to enable small print to be read at midnight on the deck of a vessel forty miles distant.

Much new ground remains to be explored in almost every department of Natural History on this coast. We had unfortunately no professed naturalist with us, and had neither time nor opportunity to make collections, nor space to carry them; but among the specimens casually collected by Mr. Bartle Frere, and imperfectly preserved, were found some of novelty and interest. The fishes of Zanzibar, we believed, had been so fully described by Colonel Playfair and Dr. Günther, that there was little hope of finding anything new or rare; but among the few skins prepared for us by Colonel Playfair's Swahili pupil, whom we found acting as coxswain of Dr. Kirk's boat, Dr. Günther found eight species previously not known at Zanzibar, and twenty examples worthy a place in the British Museum. One of them Dr. Günther had never seen before. An apparently new species of squirrel and several rare birds were also found among the few skins of land animals brought home. In a note which he kindly wrote to me regarding the fishes, Dr. Günther adds, "I found in the boxes four different kinds of living spiders, which are quite new to us, and are evidently an importation from Zanzibar. One is a most curious long-legged form."

In geology it is quite possible that the hydrographer's operations may lead to very important discoveries. It is now certain that coal is found in great quantities, not only on the Zambezi River, but on the Rovuma. On the former river the misgovernment of the Portuguese renders the coal practically for the present inaccessible, but there seems no reason why the Rovuma beds should not be worked and the coal exported, if, on further examination, they should be found sufficiently thick to repay working; and it is

possible the beds might be found near the river, and within reach of the boats of a surveying vessel.

In Zoology there are a multitude of questions which can hardly fail to receive elucidation. Besides the possible discovery of new or rare species, a survey expedition on the East African coast would afford unrivalled opportunities for adding to our knowledge of the habits of the coral insect. A surveyor would naturally turn his attention to the causes which render the north-east shoulder of Africa so free from the coral reefs which abound on the shores of the Red Sea, and also throughout the coast south of the Juba Islands.

The history of the Tzetzi fly is another most interesting problem in zoology. It appears clear that the fly is far from being a general inhabitant of all parts of the coast. It pervades certain districts, and is often found over a very limited strip of country, while the country on either side of the strip is entirely free from it. It is observed that it is most common and fatal in the districts which still afford shelter to the zebra and giraffe, and that it is very apt to disappear when the larger animals are driven away by the approach of civilised men. The geographical laws which regulate the distribution of the fly will, doubtless, in time be discovered, and it may not be impossible to throw some light on the curious difference which exists between the effect of the bite of the fly on various animals. Inquiries of this kind must prove of the greatest practical advantage to agriculture and commerce, for there can be no doubt that the havoc caused among cattle and beasts of burden by the Tzetzi is one among the many causes which have retarded civilisation in East Africa.

Every African traveller has had sad experience of the difficulties arising from the scarcity of beasts of burden, and the wish has often been expressed that the art of domesticating the African elephant could be recovered, at least to the extent known to the Carthaginians. It may therefore interest the Society to hear that we saw at Zanzibar a fine young African elephant, about 6 feet 6 inches high, perfectly tame, and as capable of useful labour as an Asiatic elephant of the same size. He was said to be the first of his kind that had ever been seen at Zanzibar, and is now at Bombay, in the possession of the Governor, Sir Philip Wodehouse.

In Botany there can be no doubt there is a vast field of discovery to be opened on the East Coast of Africa. Many of the islands, such as Pemba, Johanna, and Comoro, have never been thoroughly examined by any scientific botanist, and some of the results can hardly fail to prove of great commercial value. The orchilla-weed

has long been an article of export in large quantities, and though now somewhat superseded by the weed procured in South America, there are probably other dye-weeds and vegetable products useful in dyeing which will reward researches of the scientific botanist. Palm-nut oil has in this manner been already added to the commercial exports of East Africa. The existence of the oil-nut palm was not suspected on the Zanzibar coast till the tree was recognised by Dr. Kirk. Since that, the oil has been exported in considerable quantities. We were informed that it was formerly common in Zanzibar, but had been cut down in clearing the jungle. Madagascar appears to abound in valuable cabinet woods, ebony, &c. Cotton appears to grow wild on many parts of the coast. Botanical researches may show whether the plant is a native or descended from imported varieties. Many parts of the coast are obviously well adapted for the growth of coffee, and a list of oil-seeds which are now exported may be considerably augmented by fresh discoveries.

The Meteorology of this part of the continent is very imperfectly understood. The information collected by Mr. Findlay has done much to indicate the ordinary hurricane paths; but there is evidently a wide field for investigation open to the meteorologist, whose labours are sure to be attended by important practical results —such for instance as the discovery of salubrious sites and the elucidation of many sanitary problems. It is a curious fact that the mortality among European crews on this coast has greatly decreased since the ships have been restricted, as far as possible, to the use of distilled water. Accurate chemical examination of the waters commonly used in drinking by the inhabitants of the coast may possibly lead to discoveries which will much diminish the risk from fever. The medical officer can hardly fail to have his attention directed to the cause of the general immunity of this part of the coast from liability to attacks of sun-stroke.

The observations of the Hydrographers will also naturally add much to the excellent current-charts in Mr. Findlay's Manual, which are of great value to the navigation of these seas.

Possibly, also, further Meteorological observations may throw light on the best season for commencing a journey from the East coast into the interior. I was surprised to find that some old European residents at Zanzibar maintained that June was a better season to start in than December. Though this opinion is so contrary to received views on the subject, it deserves, from the experience of those who assert it, further careful inquiry.

The most unobservant stranger must be struck by the extraor-

dinary diversity of races to be seen on this coast. At every part will be observed the well-known varieties of Arabs, of various tribes of Hindostan and of the Negro half-caste races. The indigenous tribes may be divided under four general heads. First, the Somalis, who are found occupying the whole coast from near the mouth of the Red Sea to Lamoo. Secondly, the Gallas, who are now hardly to be found near the coast in any large numbers, and who appear to have been driven back by the Somalis. Thirdly, the negroes, in great variety of tribe and character. And, fourthly, the Madagascar races, Hovas, Sakalavas, &c.

A minute description of these races would, however, lead me further into the regions of Ethnological discussion than is desirable at present.

I have only ventured to indicate a few of the subjects in Natural Science which might receive light from the labours of officers attached to a surveying ship on the East African coast, and I have no doubt that H.M.'s service contains many gentlemen, in its various branches, who are capable and willing to emulate the labours of Banks and Solander in earlier days, and of Richardson, Hooker, and Darwin in our own.

MUTU COOMARA SWAMY MODELIAR said he desired to express the appreciation of the natives of India of the endeavours of England to suppress the slave trade throughout the world. Not only the enlightened nations of Europe and America, but even the semi-barbarians of Asia acknowledged the merit of the labours of such men as Dr. Livingstone and Sir Bartle Frere. The President had stated that on the East Coast of Africa the English were regarded as good paymasters, and as rather exacting in what they considered to be their rights, but at the same time thorough lovers of justice; but there was one feature of the English character which such missions as that which Sir Bartle Frere had so successfully accomplished would impress upon the minds of foreigners, namely, that they were lovers of humanity. For a man like Dr. Livingstone to leave his home and cut himself off from the comforts of civilisation, and bury himself in the deserts of Africa for the promotion of the cause of humanity in general, was a picture which went straight to the hearts of men, not only in this country and in America, but in Asia too. He hoped that his countrymen in India would profit by what had been done, and that even those who were connected with the slave trade in Zanzibar would not disregard the advice given them by Sir Bartle Frere. An old adage said that there would be no thieves if there were no receivers of stolen property, and he was quite sure if the natives of India who were connected with the slave trade (and they were the dregs of Indian society) ceased to have anything to do with it, slavery would soon come to an end. He urged, in conclusion, the importance of extending railway communication through Egypt and on to the coast of Africa, as a means of perfectly accomplishing the objects of Sir Bartle Frere's mission.

Sir H. RAWLINSON said he was proud and gratified to find that he had handed over his office to such a thoroughly competent traveller and gentleman as Sir Bartle Frere. It must be a wonder to all that, amid the many difficult and delicate negotiations which occupied his time in Zanzibar, he had

been able to devote attention to the accumulation of so many interesting facts regarding the physical geography and ethnology of Eastern Africa. He had alluded to the treaty which had been entered into with the Sultan of Zanzibar, and it would be most gratifying to the meeting if he could, without any breach of confidence, tell them if the treaty fulfilled his own expectations.

The PRESIDENT said as far as he was aware the treaty which had been executed by Dr. Kirk was entirely satisfactory to every one connected with the mission. He begged them, however, not to be satisfied with the treaty, which was merely the latch-key delivered to them by the Sultan of Zanzibar, by which they could enter into his house when they pleased; and the objects of the mission could only be thoroughly accomplished by the expenditure of English energy, enterprise, money, and by steadfastness of purpose. The suppression of the slave trade was only one step towards the Christianisation and civilisation of Africa.

ADDITIONAL NOTICE.

(Printed by order of Council.)

Letter from R. B. N. WALKER, F.R.G.S., *on a Journey up the Ogowé River, West Africa.*

GABOON, W. AFRICA, February 14th, 1873.

IN accordance with my promise before setting out, I now send you a few lines to announce my safe return from the Ogowé, in which river I remained 70 days, ascending it to a distance of nearly 300 miles, the last 75 of which were up a succession of difficult and frequently dangerous rapids: several of the canoes accompanying me were upset and dashed to pieces, in one instance with loss of life; and in descending, my own canoe was swamped, my instruments, &c., narrowly escaping.

Time does not now permit of my giving you full details, and not having had a Nautical Almanac for this year with me, I was unable to work out my observations for longitude on the spot, and since my return I have not had time to do so, but I will shortly send the whole of my astronomical observations, together with those for altitude above the sea-level, and my rough dead reckoning, to the Council of the Royal Geographical Society.

I reached a point on the Ogowé beyond 12° E. longitude, and in about 8′ S. latitude, from which I was able to trace the course of the river some 15 or 20 miles farther; but my time being limited, and an attack of fever intervening, I was reluctantly compelled to return, although the natives were not only willing but anxious that I should proceed farther, which, to my great regret, I was unable to do. I am able, however, to state that from the foot of the first rapid, in about 10′ S. latitude, up to the extreme point attained by me, and as far beyond as I could see, the Ogowé never touches the equator, its course being winding, with a general E. and W. direction, and confined between 4′ and 10′ S. of the line, its width constantly varying from less than 100 yards to a mile or upwards, which latter dimensions it attained at Lopé (an Okanda village) where my journey in canoe came to an end. I endeavoured to penetrate farther by land, but my progress was barred after a few miles by swamp, and, fever attacking me on the following day, I renounced the attempt. The country from the foot of the rapids is moun-

tainous, grass succeeding jungle after about 20 miles, and continuing as far as I went or could see, but beyond the Okéko (or Mokéko) mountains, through which the river cuts its way just below Lopé, the country becomes lower. I was disappointed in the height of the mountains, which, with true Negro exaggeration, had been represented as attaining great elevation, but the highest I saw, Otombi (or Motombi), at the commencement of the Ajingi country, and at the foot of which are the dangerous rapids of Banganya, does not appear to me to attain a greater altitude than 3000 feet above the sea-level. Both Otombi and Onjiko (or Monjiko) had in 1866 been described to me as active volcanoes, which I now find to be an error, the natives having intended to say that their height was so great that they were constantly enveloped in mist resembling smoke.

At a distance of 30 to 40 miles beyond Lopé, occurs the great fall of Obowé, which I was most anxious to reach, and should have done so had time and my health permitted, but the natives with whom I travelled lost so much time halting and palavering at nearly every village on the way, taking fourteen days to accomplish what could easily be done in four or five, that I had to renounce the idea. As I have said before, the Ogowé does not cut the line up to the point where its course was traced by me, and beyond that, native information induces me to believe it turns more to the southward. At any rate, no native of the countries visited by me, nor slave from the interior, has the remotest idea of where this magnificent river rises; but that it originates in, or receives one or more large lakes, there can be no doubt, as the testimony of slaves from distant regions points to this conclusion, as do also many facts connected with its periodical rise and fall.

About 10 miles above the first rapid, and in latitude 7′ s., the Okanda (or Ogowé) is joined by the Okono (the Iconi of the French), an important stream running for some distance nearly parrallel with the Okanda, and, like it, choked with rapids, but which river I had no time to examine.

The mountains through which the Ogowé runs are simply immense masses of granitic and other rocks, covered with a thin coat of reddish earth. The bed of the stream contains rocks, apparently of volcanic origin.

I have seen sufficient to convince me that the Ogowé is a most important river, and the great artery of Western Equatorial Africa, probably having its source in or near the most western regions now being explored by Dr. Livingstone; and I think it highly desirable that the Royal Geographical Society should no longer neglect such an interesting field for exploration, but without further delay organise and despatch an expedition to trace the Ogowé to its source, as doubtless many competent volunteers would at once come forward. For my own part, my present occupations preclude my doing more, and I can but call the attention of the Council of the Society to the matter, in the hope that the proper steps may immediately be taken: if not, as soon as my present business engagement comes to an end, I shall make the attempt myself, being (I think) qualified both by 22 years' residence in this part of Africa and by taste for the task. I regret that time does not now permit of my giving fuller details of my late journey, but I shall be most happy to give any additional information in my power, or to reply to any questions which the Council of the Royal Geographical Society may think fit to put to me on this interesting subject.

R. B. N. Walker.

P.S.—There is a very remarkable feature connected with the lower course of the Ogowé—that is, the number of considerable lagoons communicating with it, especially along the left bank. The Lakes Onlangé, Azyingo, Ezanga, and Ogemwé, the three former of which I visited, are, I think, properly so termed, but there are many other considerable bodies of water which I think should be more properly called fluvial lagoons.

R. B. N. W.

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